Second Round Test Results – Progeny System

Itron

12/17/2012

REPORT OUTLINE

- Why a 2nd Round of Testing
- What was Tested
- Test Sites
- Summary Test Results
- Detailed Test Results by Site

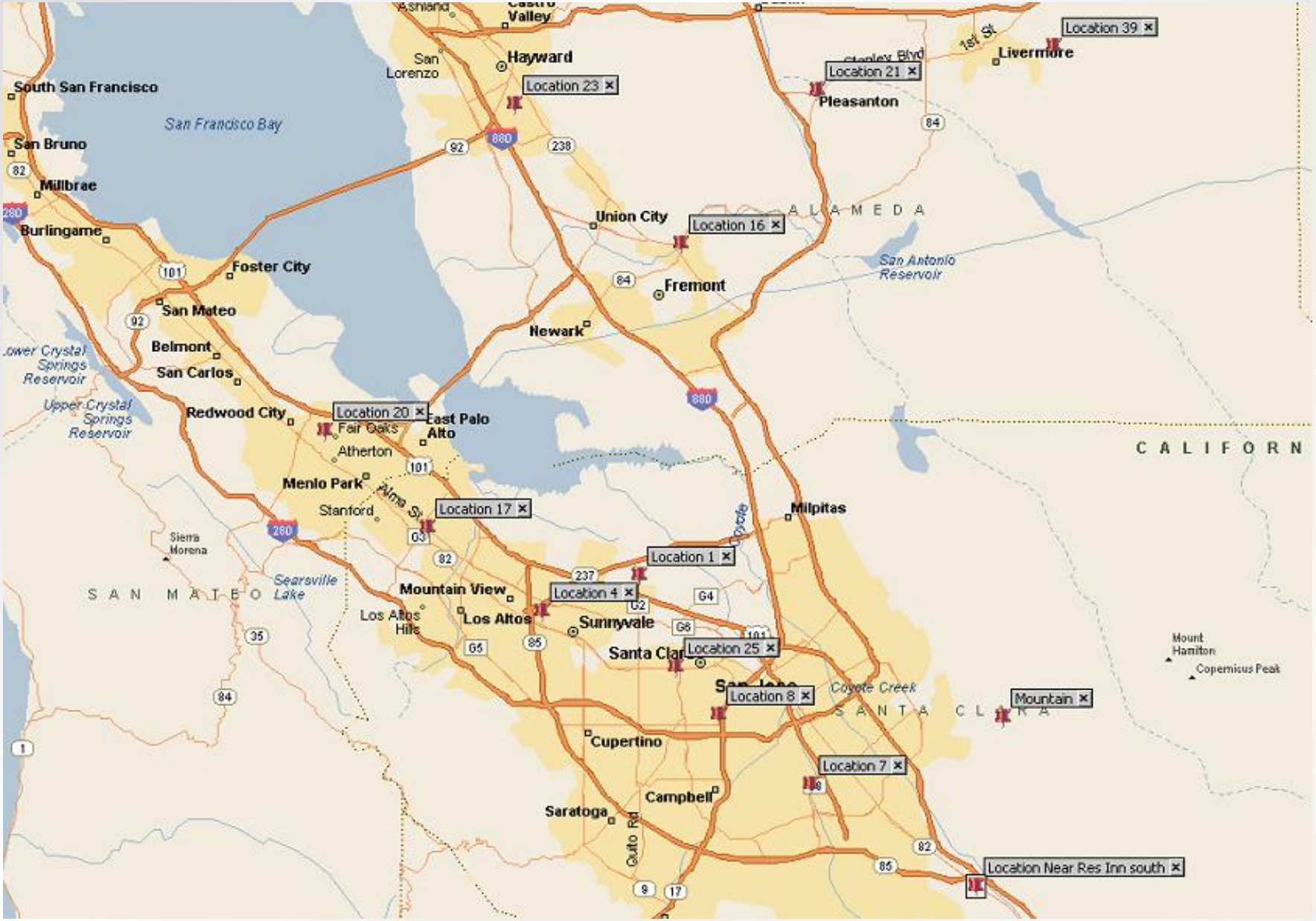
WHY A 2ND ROUND OF TESTING

- Provide a more robust sample size of testing Packet Error Rates (PER).
  - 17 sites tested versus the original 3
  - PER testing provides the most useful information in evaluating the RF environment over a geographic area.
- First round testing was heavily focused on Progeny's "system test" methodology and deemphasized PER testing.
- More adequately depict the distances (in relation to Progeny beacons) whereby Part 15 devices would be impacted.
- Itron had suspected, and was confirmed through the second round of testing, that the Progeny proposed channel utilization was not only harmful to unlicensed systems within the primary area of targeted operation but also extended well beyond.

WHAT WAS TESTED

- Test Dates 10/16/12 - 10/19/12
- Extensive site testing throughout the Greater San Jose Area.
- Testing was conducted in the same manner, and with the same equipment, as the PER testing with Progeny in the summer.
- 13 additional sites above the initial 3 that were accomplished under the first round of mutually agreed testing.
- Packet Error Rate (PER) testing at 25 and 50 ft above ground level.
- Channel Utilization on shared channels.

TEST SITES


Location 39
Livermore
Location 21
Pleasanton
Hayward
Location 23
San Lorenzo
South San Francisco
San Francisco Bay
San Bruno
Millbrae
Burlingame
Foster City
San Mateo
Belmont
San Carlos
Redwood City
Location 20
Fair Oaks
East Palo Alto
Atherton
Menlo Park
Stanford
Location 17
Union City
Location 16
Fremont
Newark
San Antonio Reservoir
Milpitas
Location 1
Location 4
Mountain View
Los Altos
Los Altos Hills
Sunnyvale
Santa Clara
Location 25
Location 8
Mountain
Cupertino
Location 7
Campbell
Saratoga
Location Near Res Inn south
Coyote Creek
Mount Hamilton
Copernicus Peak
Searsville Lake
Sierra Morena
Lower Crystal Springs Reservoir
Upper Crystal Springs Reservoir
ALAMEDA
SAN MATEO
SANTA CLARA
CALIFORN

SUMMARY TEST RESULTS

SUMMARY TEST RESULTS

- Virtually every site tested in the Greater San Jose area was significantly impacted by the Progeny beacons on their proposed frequencies in the proposed method of operation.

- Moderate message reliability degradation on the 4 MHz of Progeny “shared channels “ was also seen well beyond the Progeny core service area.
  - Therefore, this potentially could affect a greater population than the Progeny’s core service area, mentioned above. This was projected through propagation modeling and validated via testing.

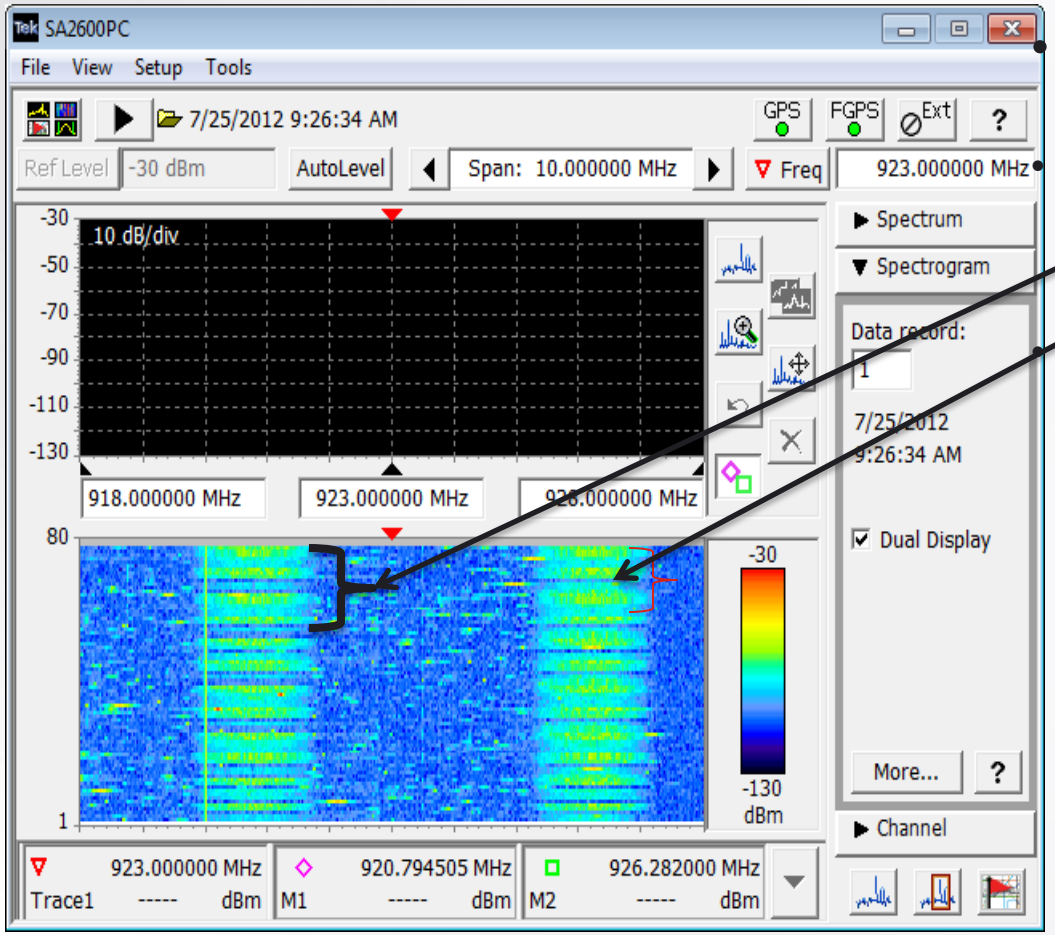
SUMMARY TEST RESULTS

- Progeny waiver to allow for beacon transmitters states: “risk of harmful interference to other users of the band would in no way be affected …”; however test results do not indicate this.
  - And compared to the original FCC intent that M-LMS systems consist of short, low duty cycle pulses from mobiles, the current high duty cycle beacon system, mounted for maximum coverage, is much more impactful than the vehicle initiated transmissions originally reflected in the original waiver.

- Progeny’s system completely overpowers all other Part 15 systems, on their proposed channels. When Part 15 devices are mounted above the local surrounding clutter, the power differential from M-LMS to Part 15 has a more detrimental affect.

EXAMPLES OF TESTS CONDUCTED

Channel Utilization on Shared Channels - Example



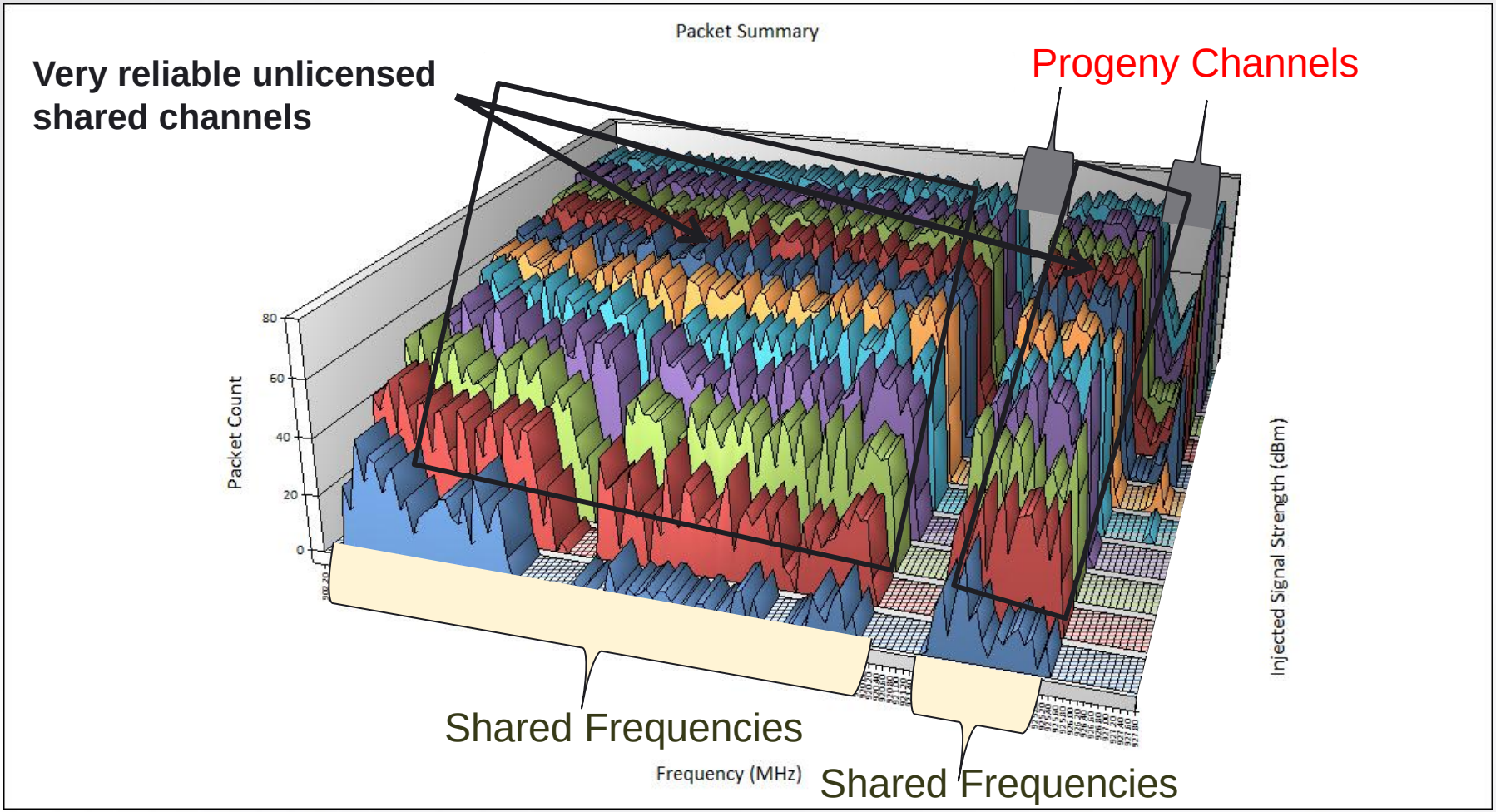
Progeny System Beacon Timing

- 100 ms time slots per beacon
- Approximately 2 seconds
- 100 ms time gap, for a 90% duty cycle

Test Equipment:

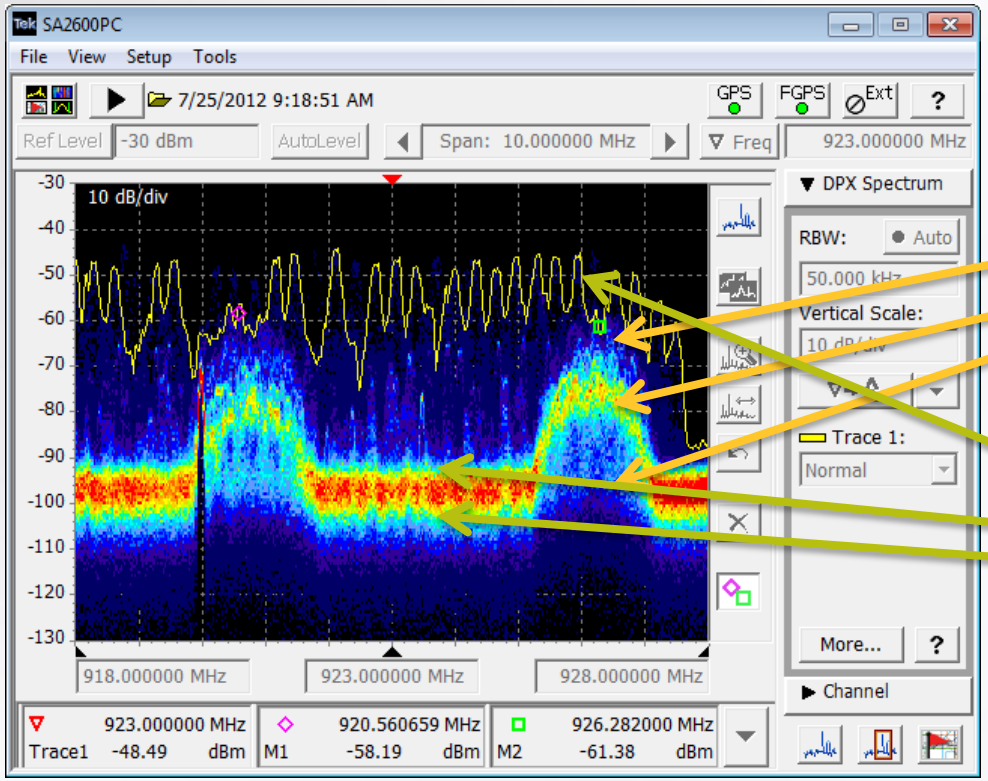
- Tektronix SA 2600 operating in DSX mode
- Band Pass filter and 15 dB amplifier

PER TEST EXAMPLE



Spectrum RF Levels Comparison – reference

Tektronix SA 2600 operating in DSX mode
With Band Pass filter and 15 dB amplifier

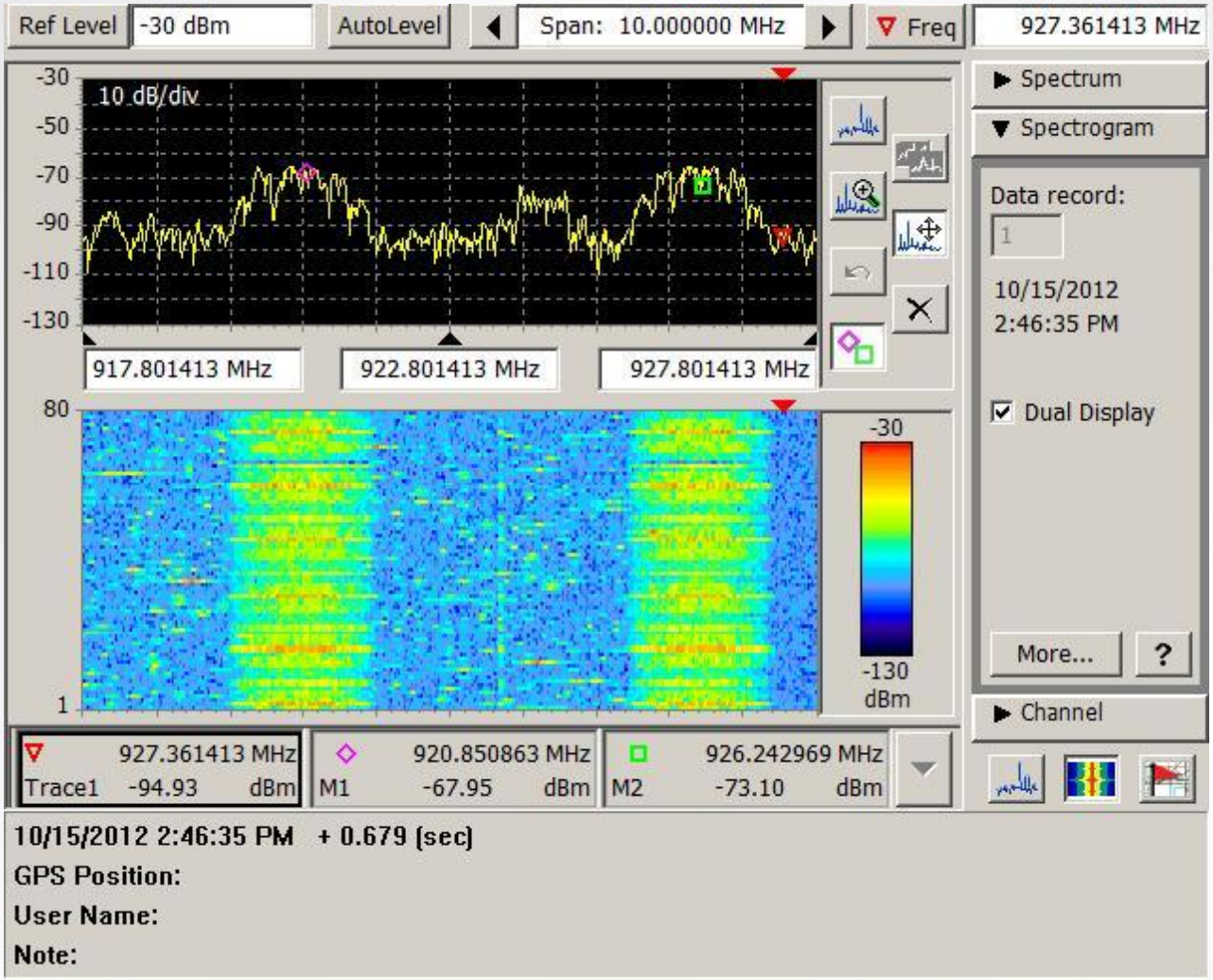


- Progeny
  - Peak Power Detected
  - Average Power Detected
  - Minimum Power Detected
- 15.247 High Speed Hopper
  - Peak Power Detected
  - Average Power Detected
  - Minimum Power Detected

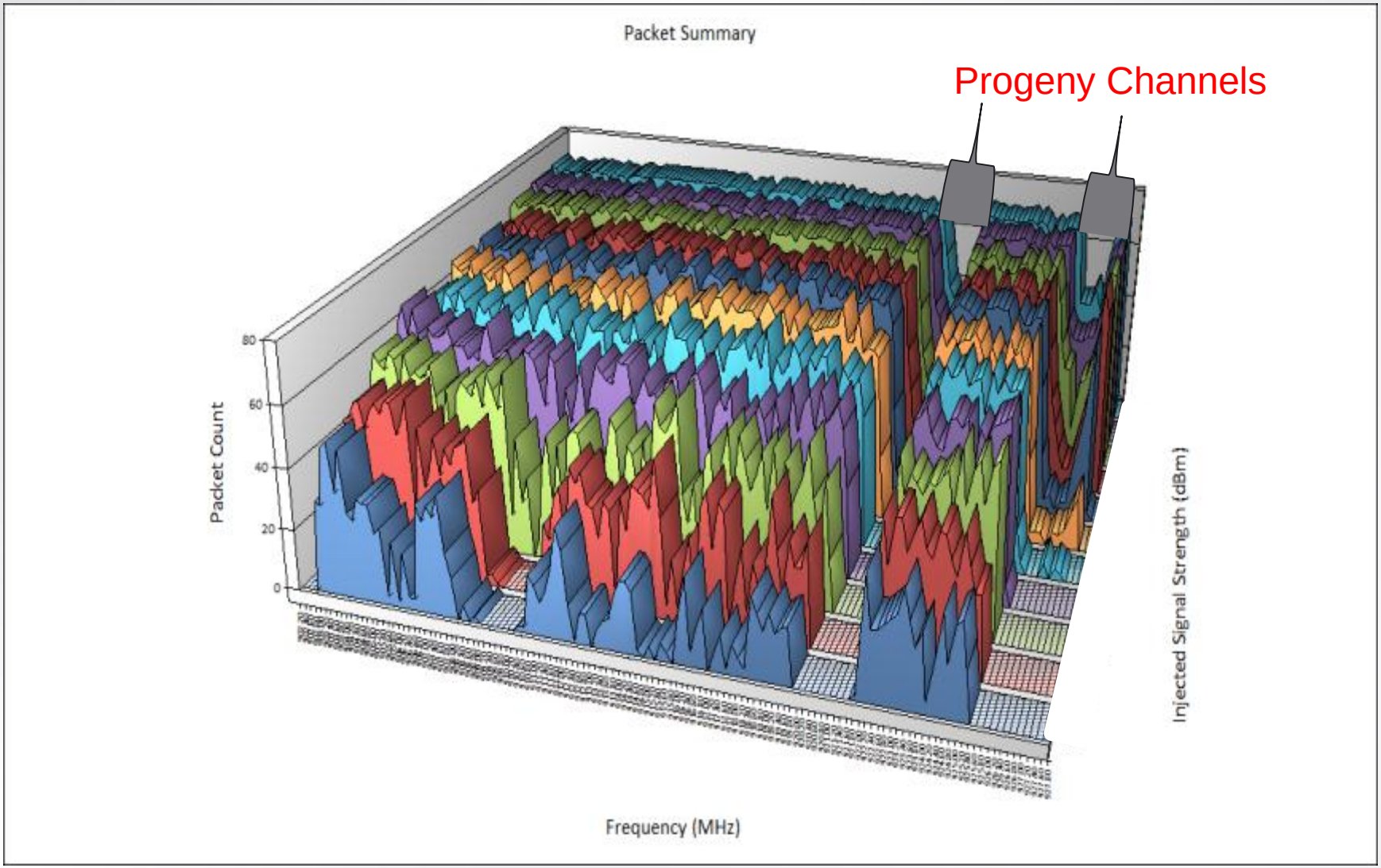
- The above depiction displays the significant difference of the Progeny RF signal average power level vs. a typical part 15 frequency hopper. Clearly the average RF power level for the composite of Progeny's proposed multiple beacon system is over 20 dB worse than a part 15 compliant system or the original intended M-LMS mobile initiated system.

DETAILED TEST RESULTS BY SITE

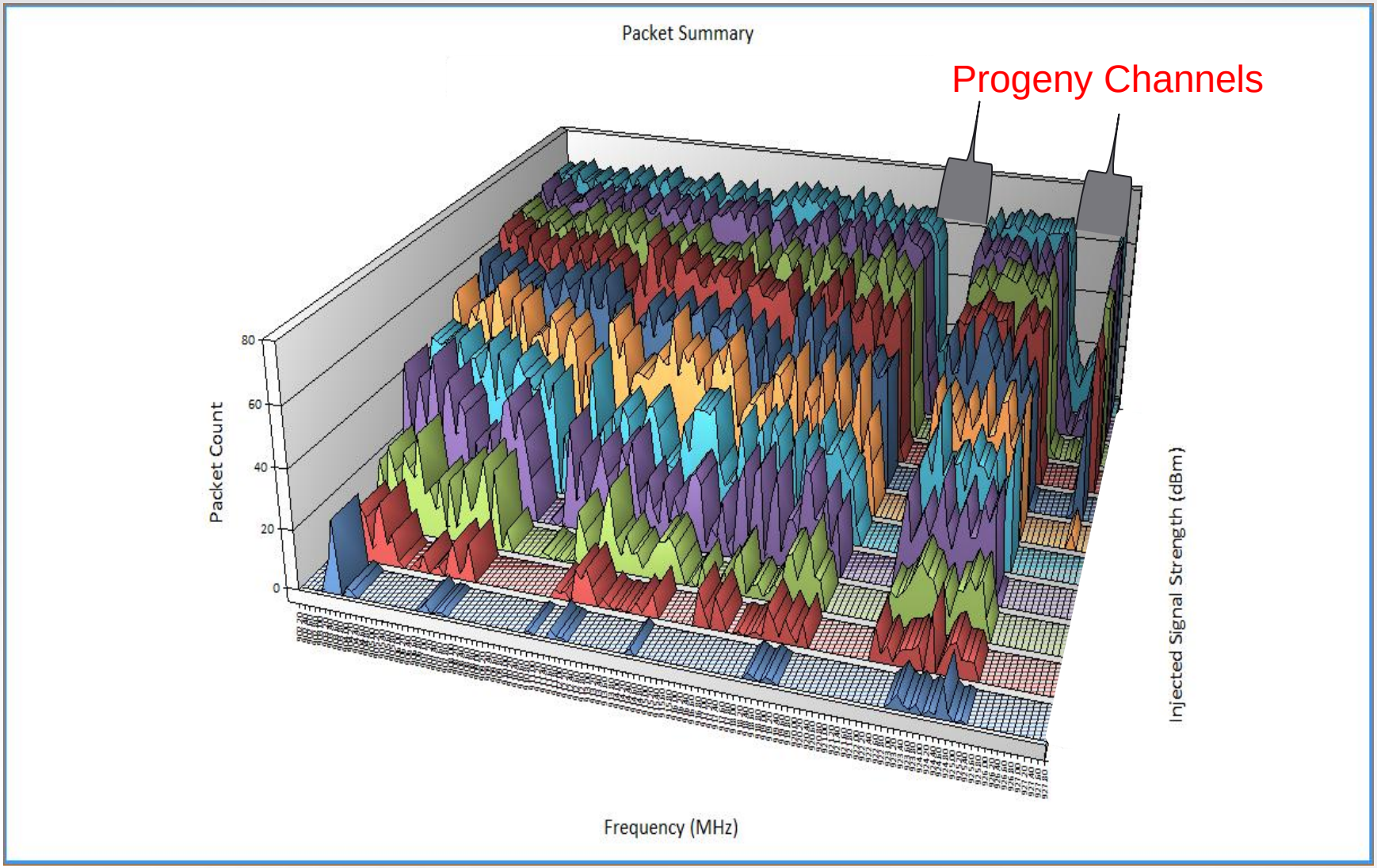
LOCATION 1- CHANNEL UTILIZATION



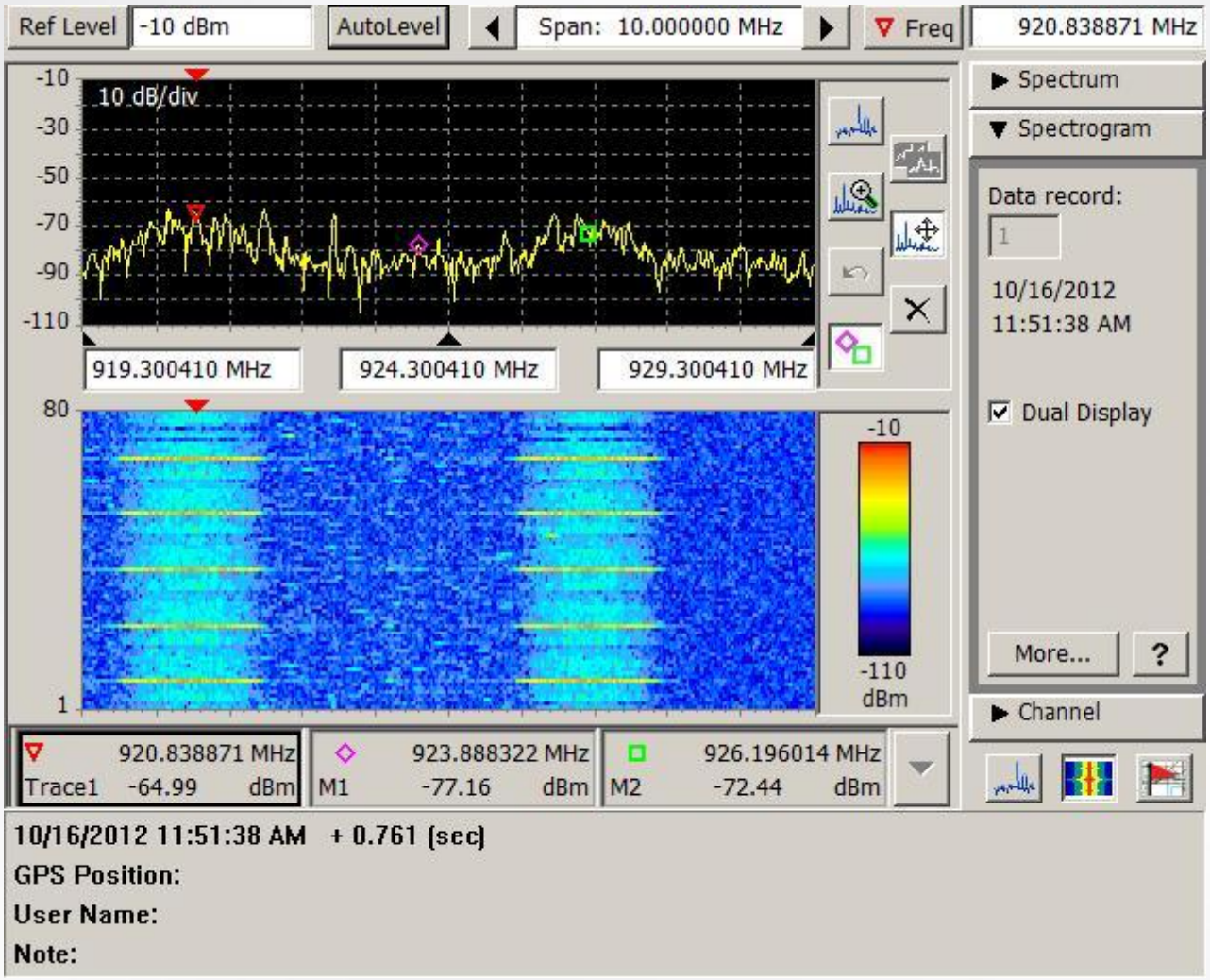
LOCATION 1 – 25 FT. PER



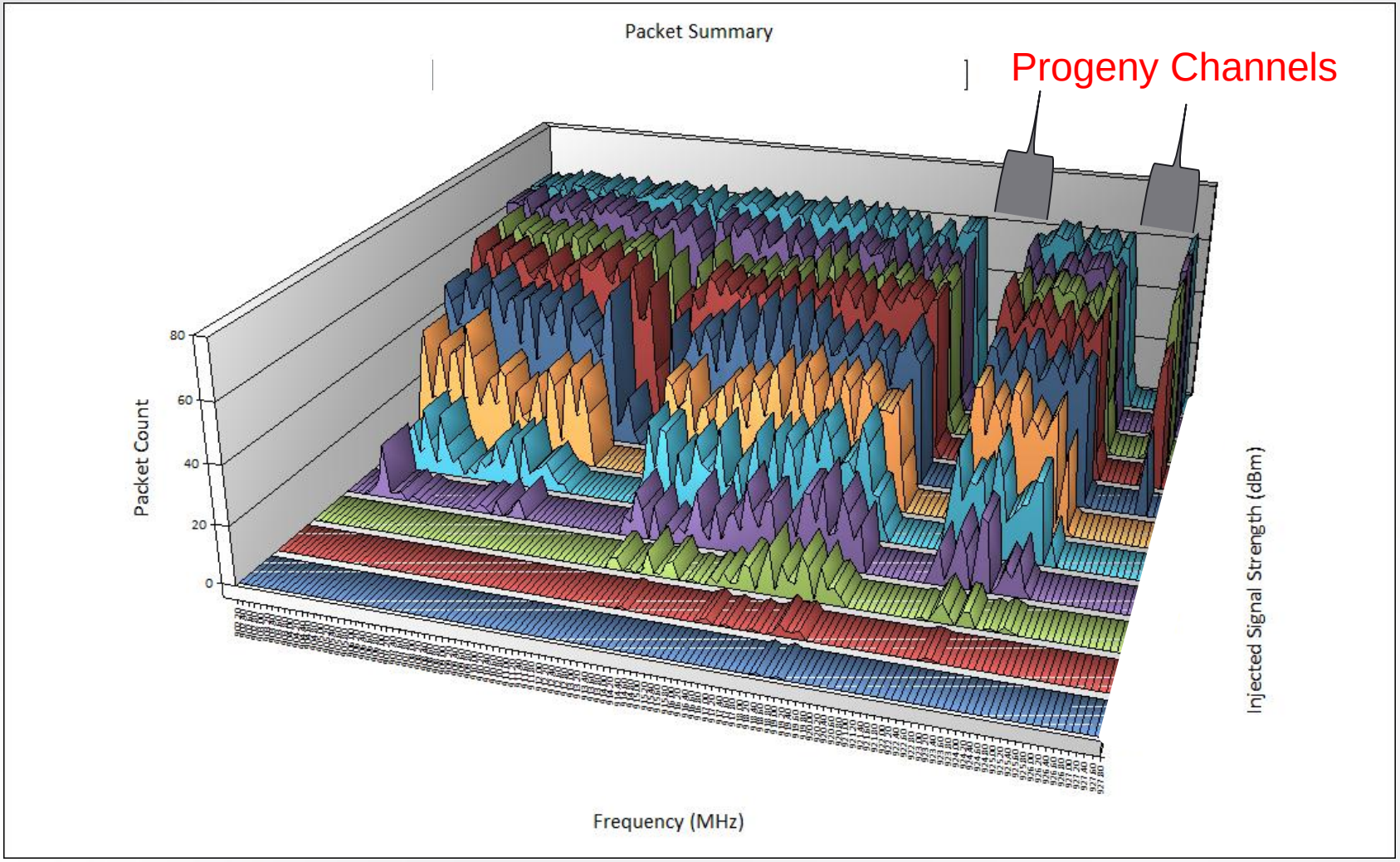
LOCATION 1 – 50 FT. PER



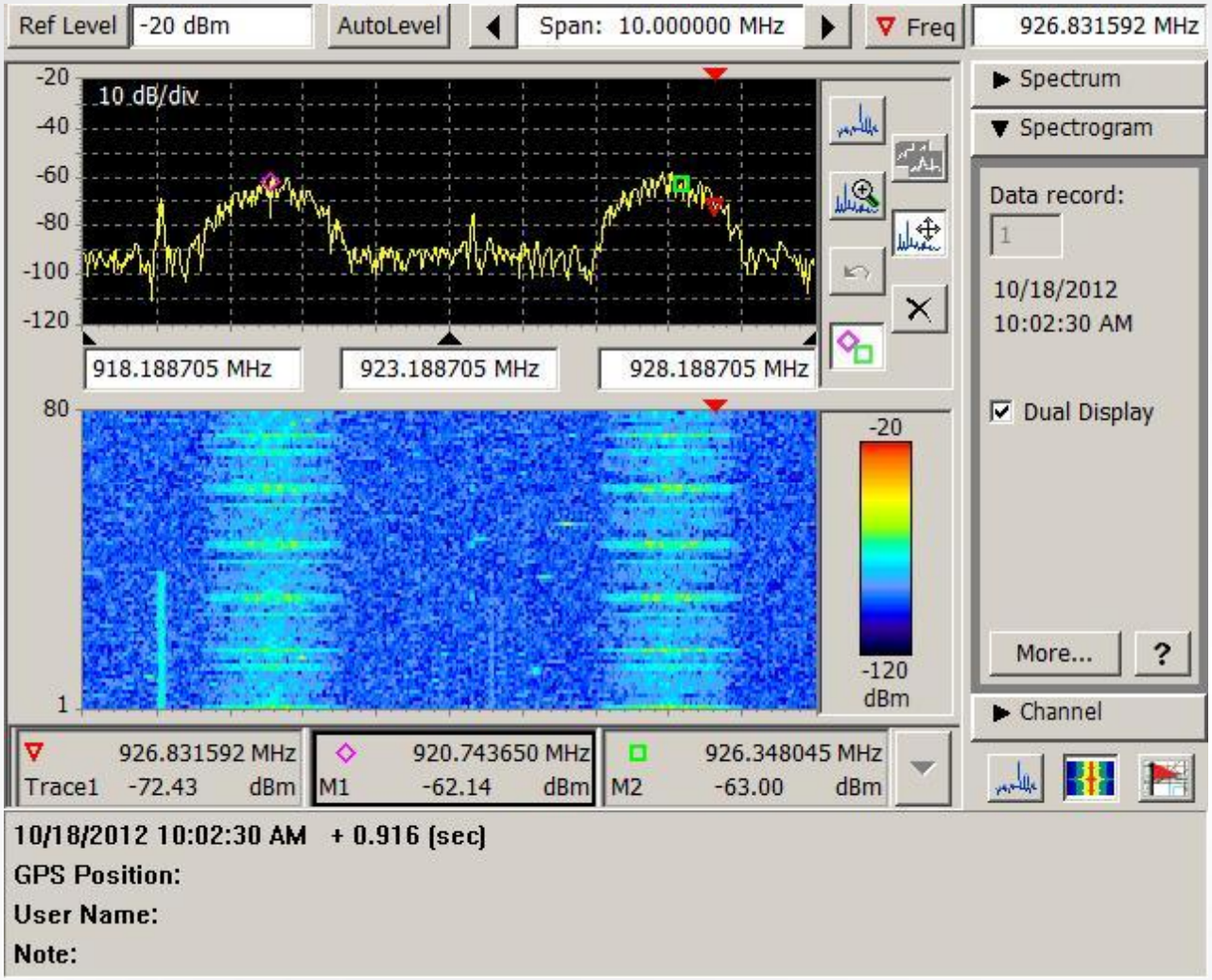
MOUNTAIN SIDE - CHANNEL UTILIZATION



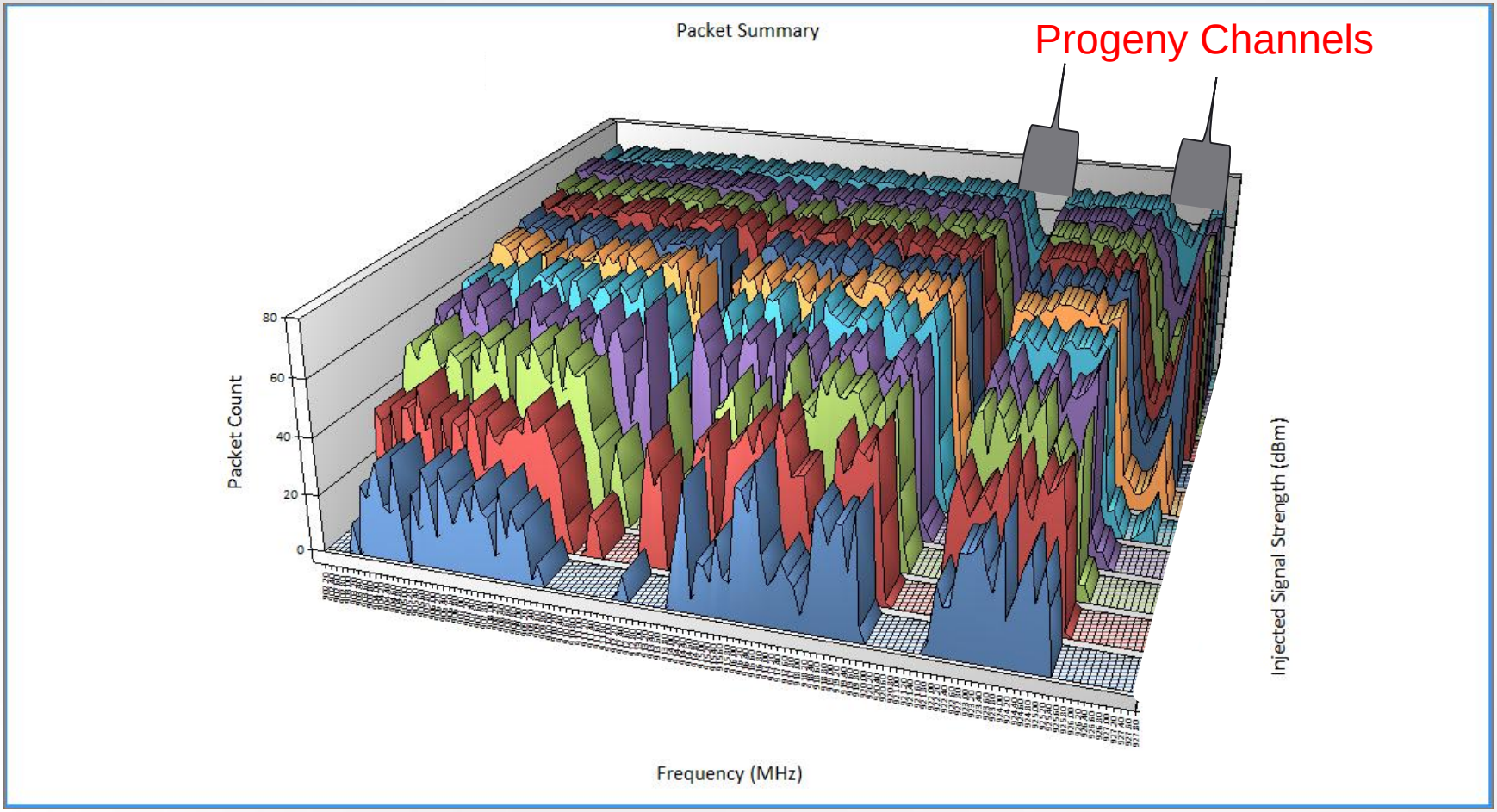
MOUNTAIN SIDE – 25 FT. PER



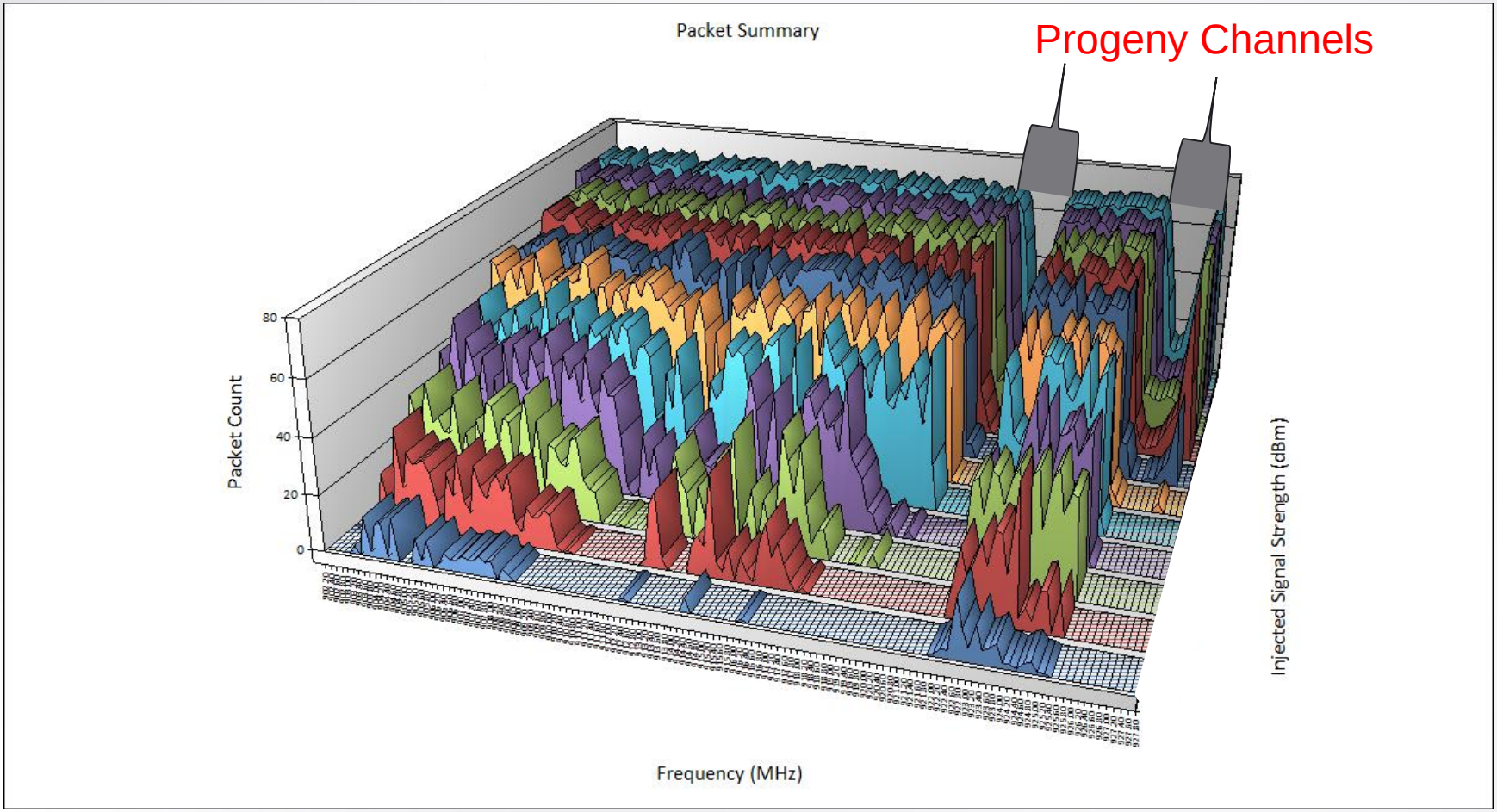
LOCATION 4 - CHANNEL UTILIZATION



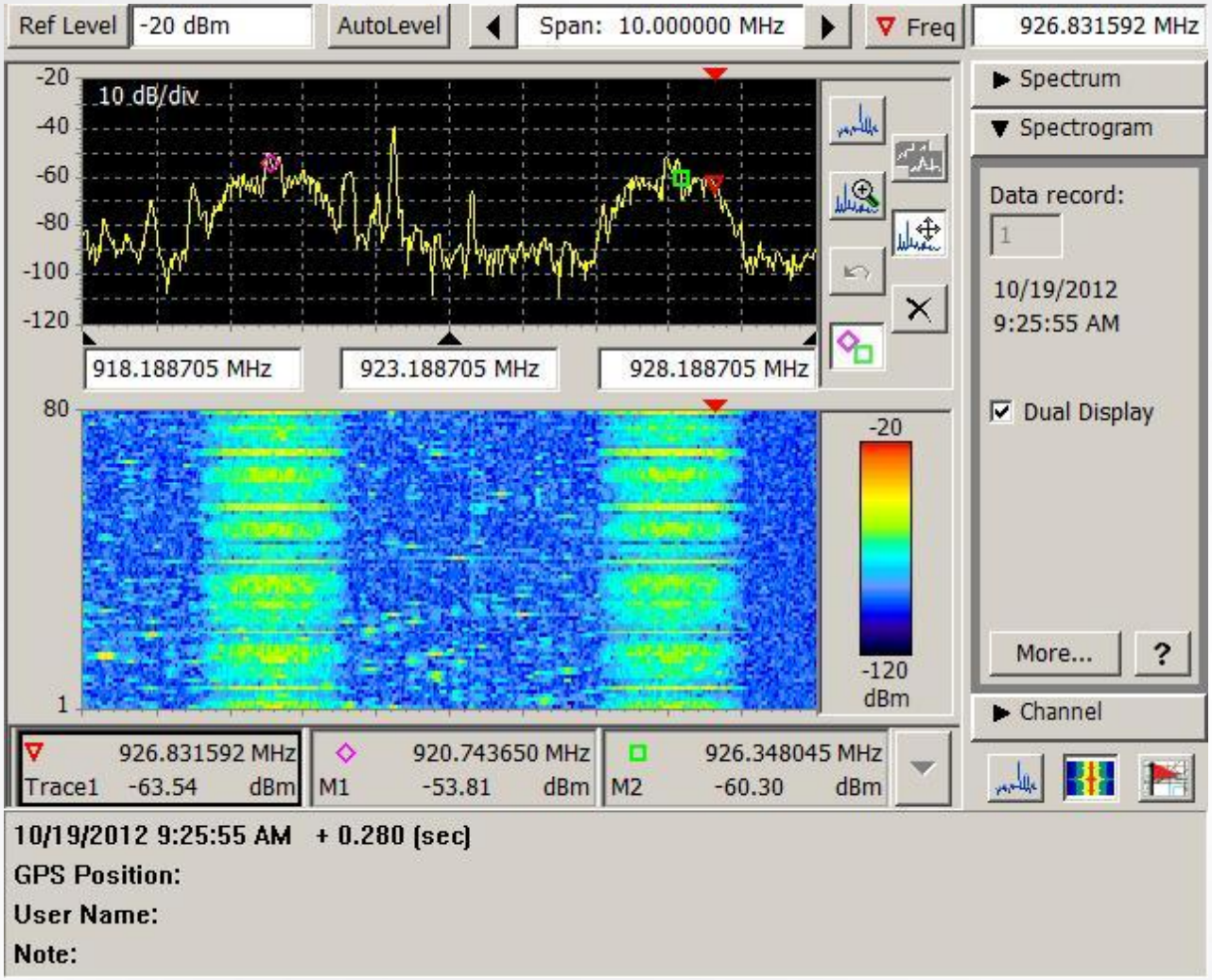
LOCATION 4 – 25 FT. PER



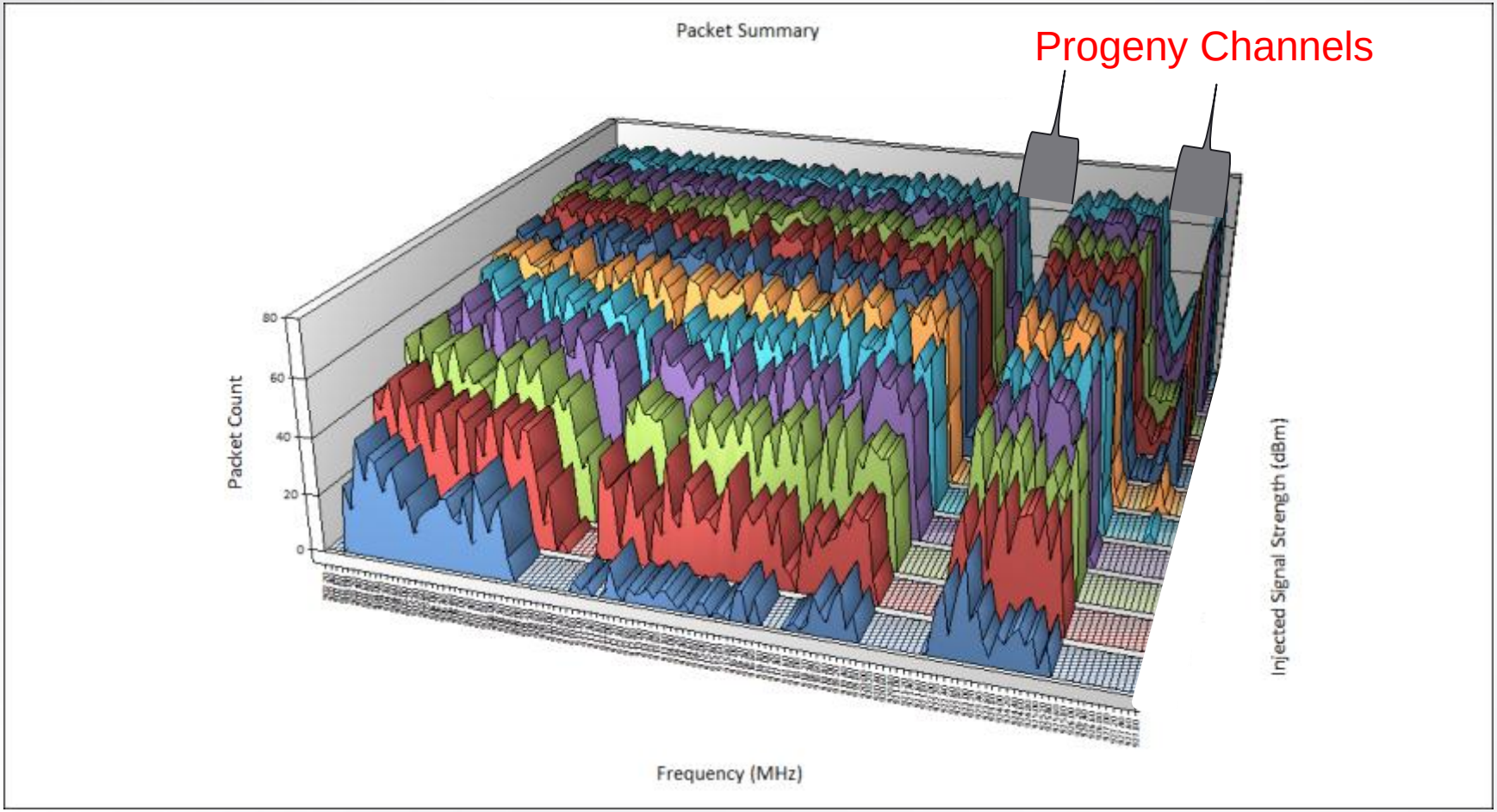
LOCATION 4 – 50 FT. PER



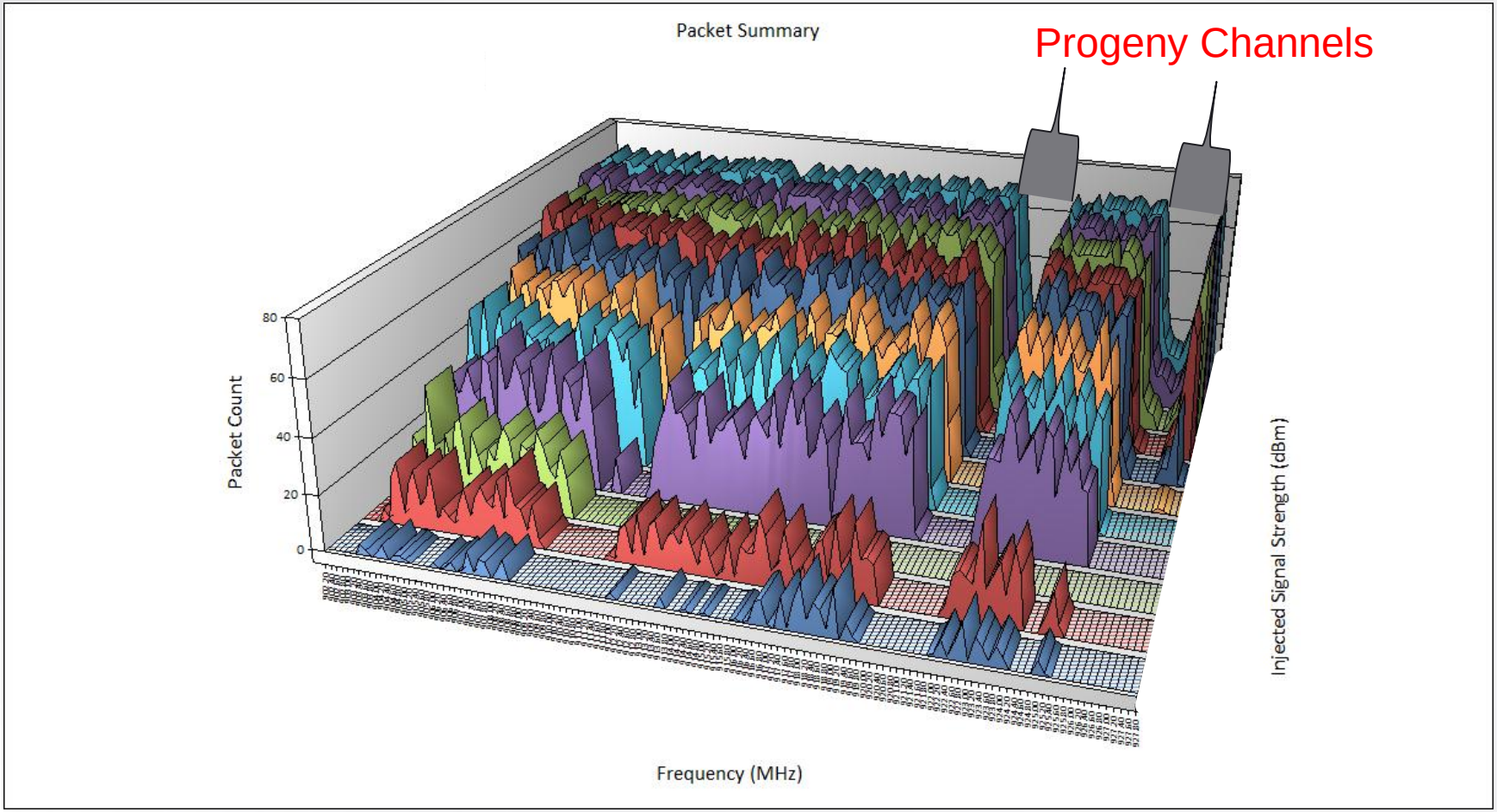
LOCATION 7 - CHANNEL UTILIZATION



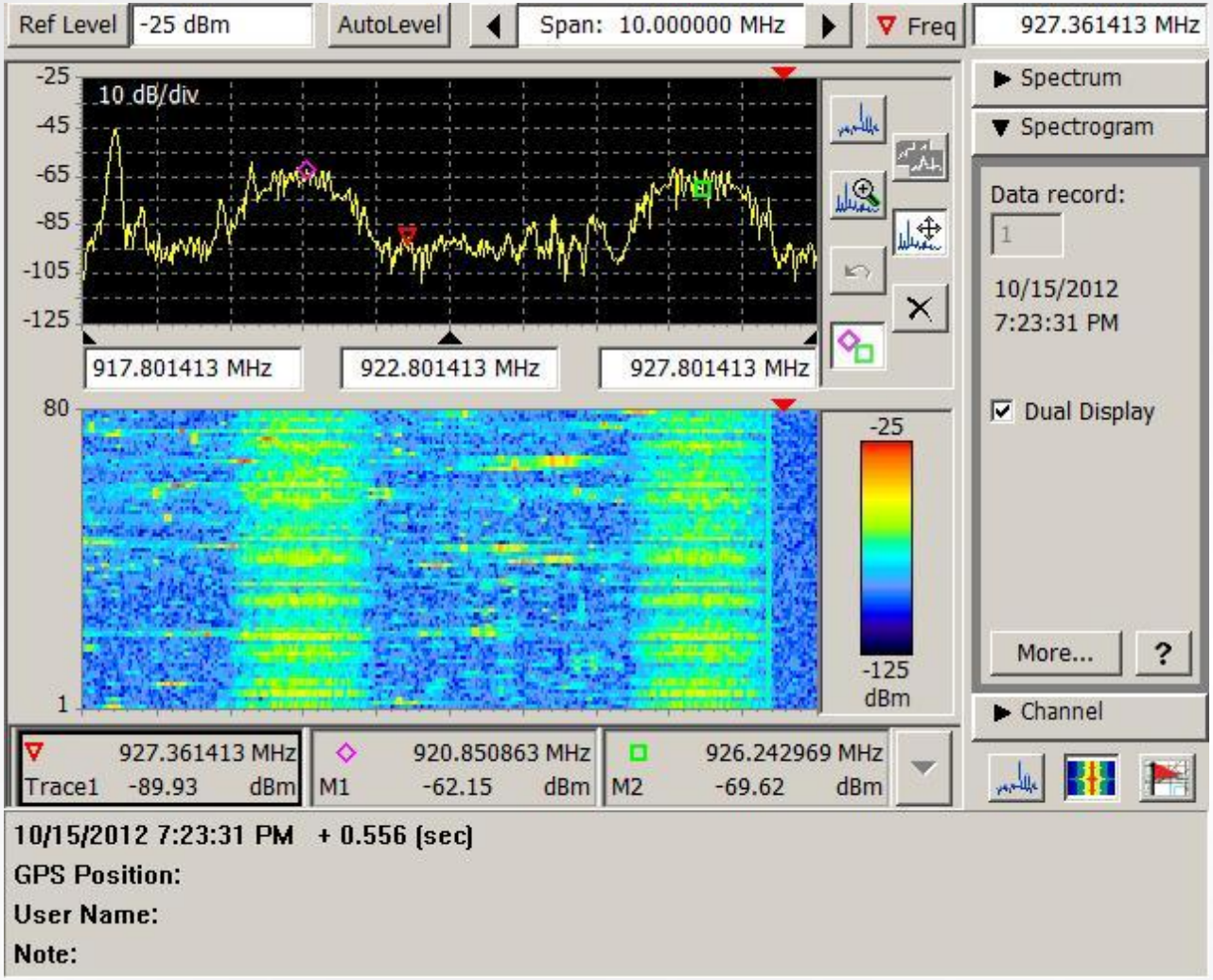
LOCATION 7 – 25 FT. PER



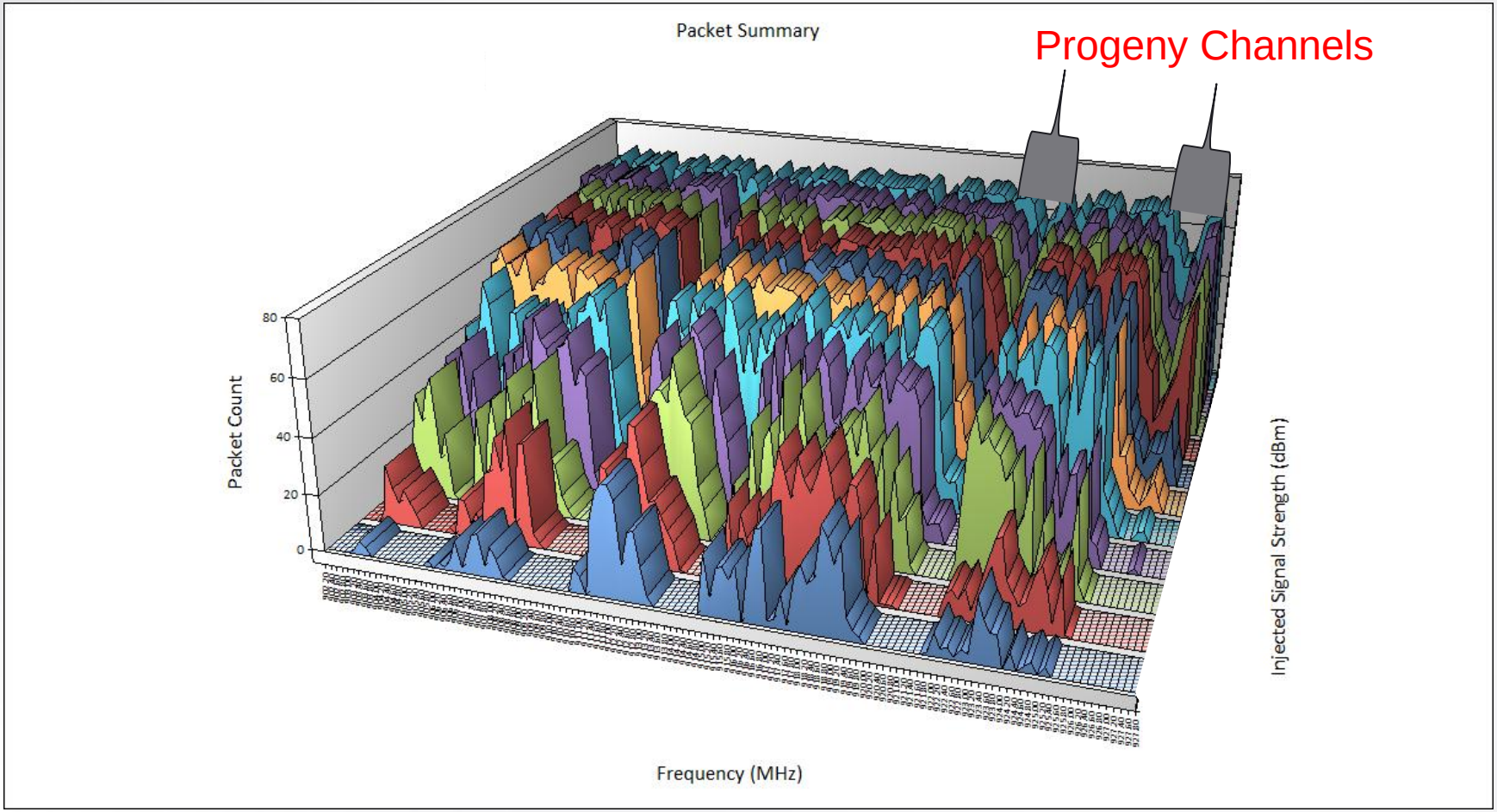
LOCATION 7 – 50 FT. PER



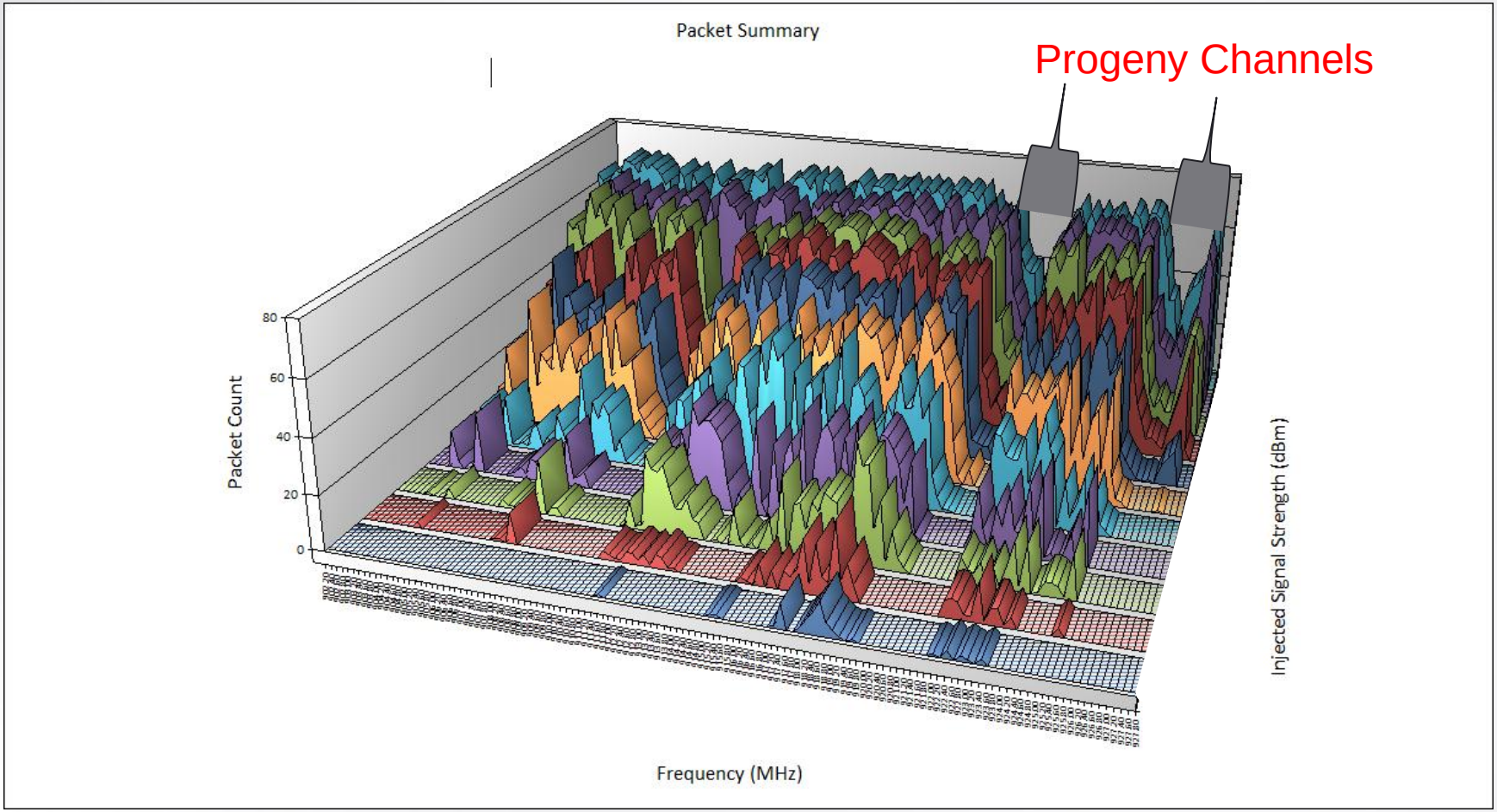
LOCATION 8 - CHANNEL UTILIZATION



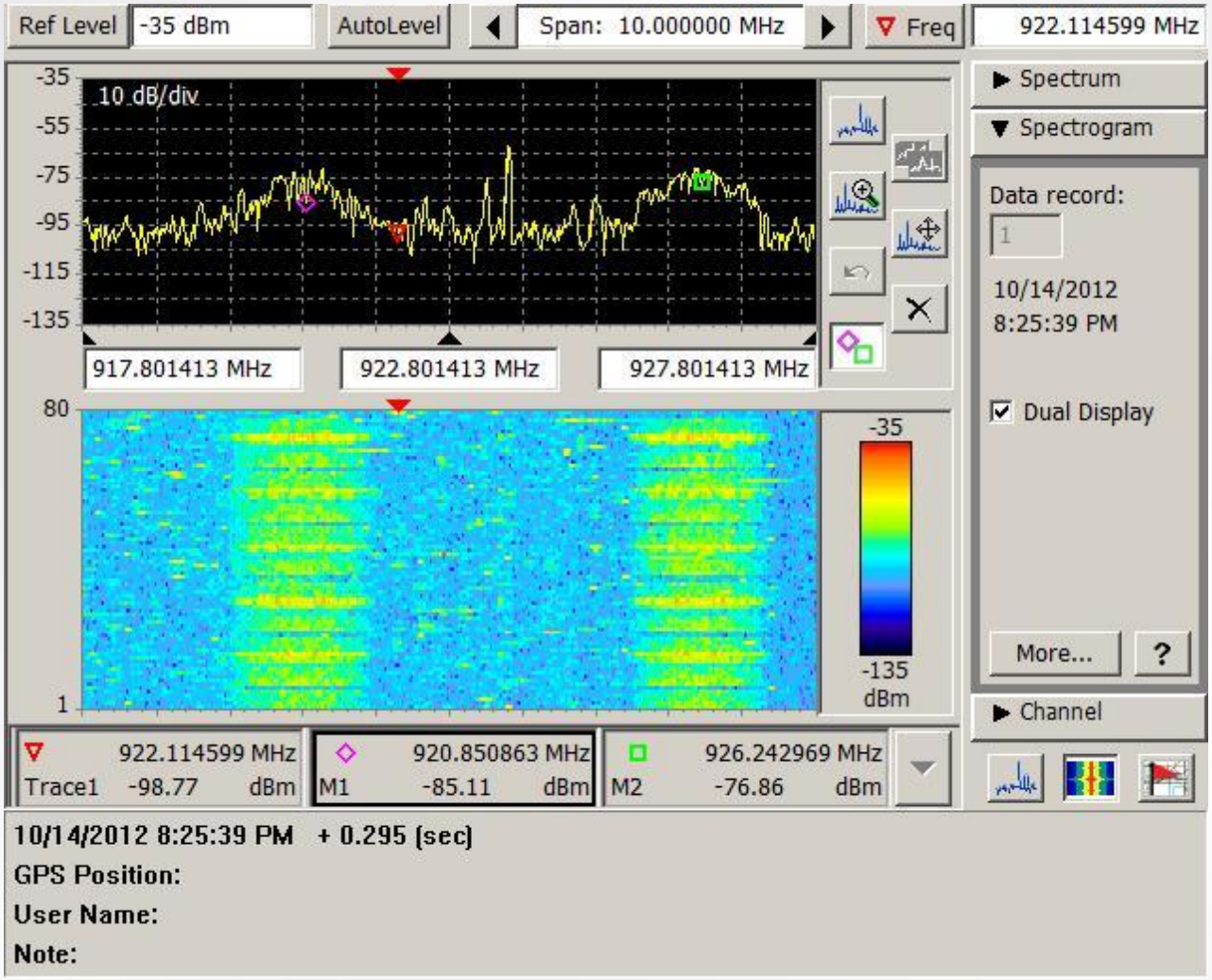
LOCATION 8 – 25 FT. PER



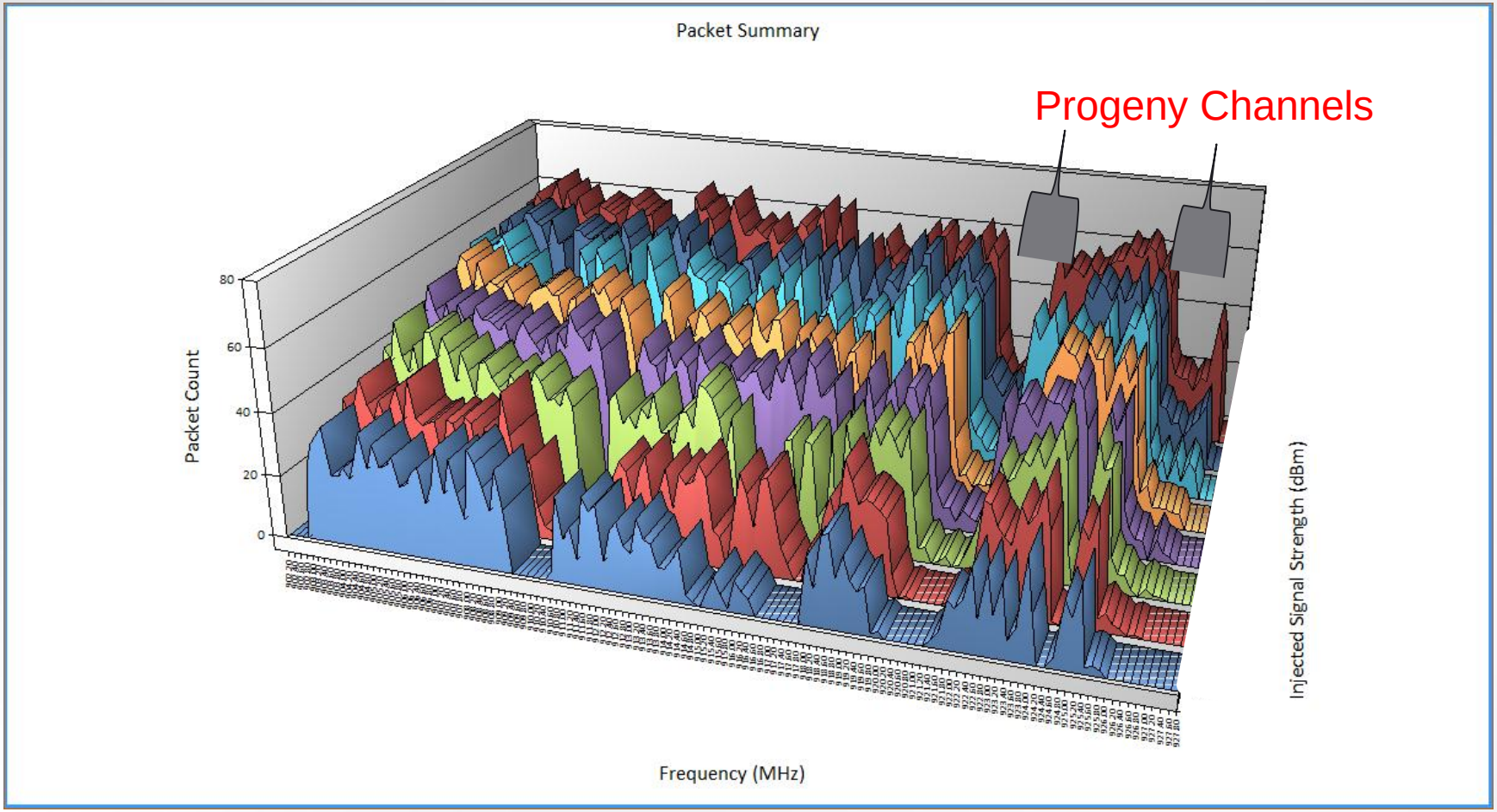
LOCATION 8 – 50 FT. PER



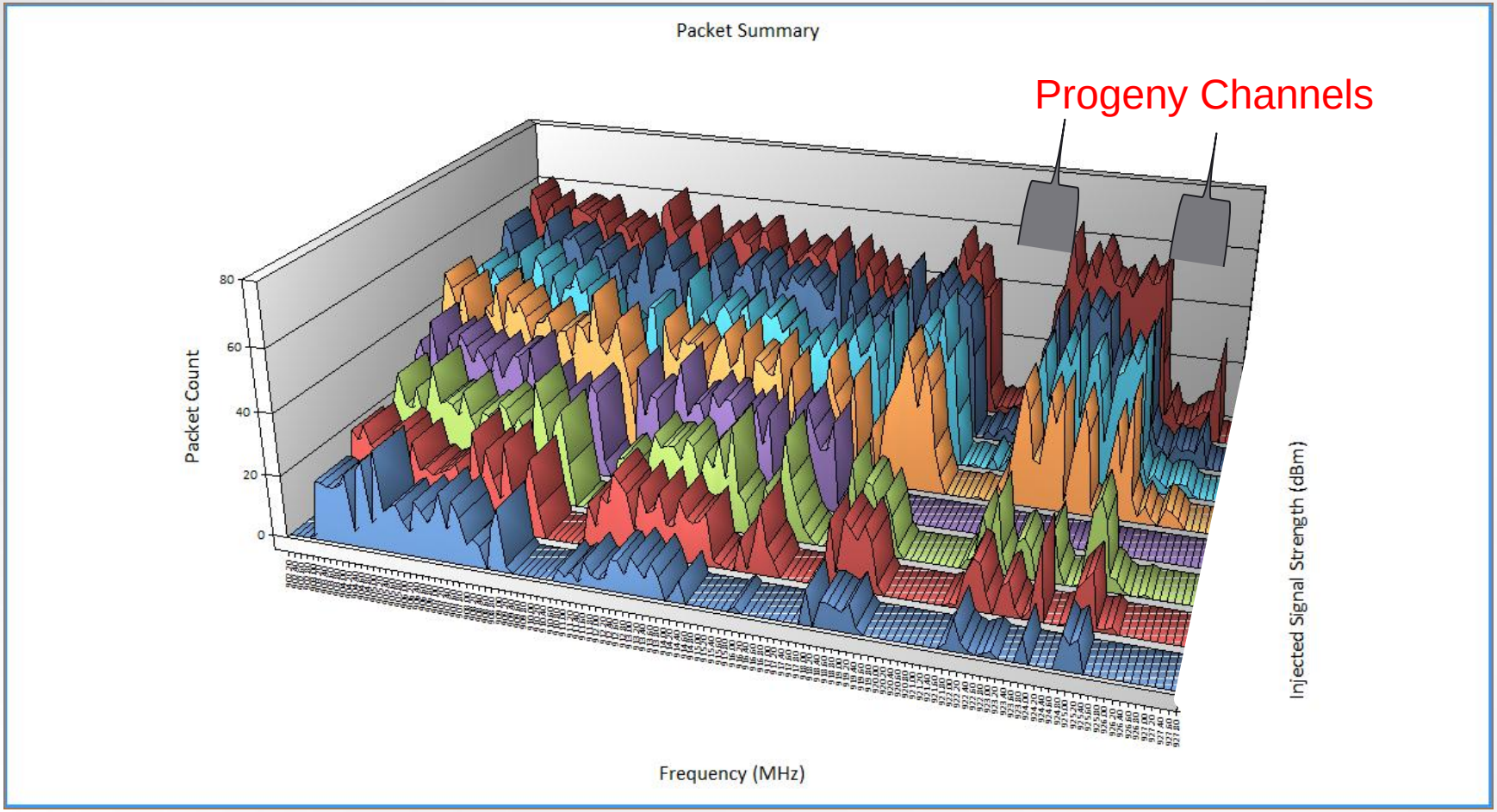
LOCATION 16 - CHANNEL UTILIZATION



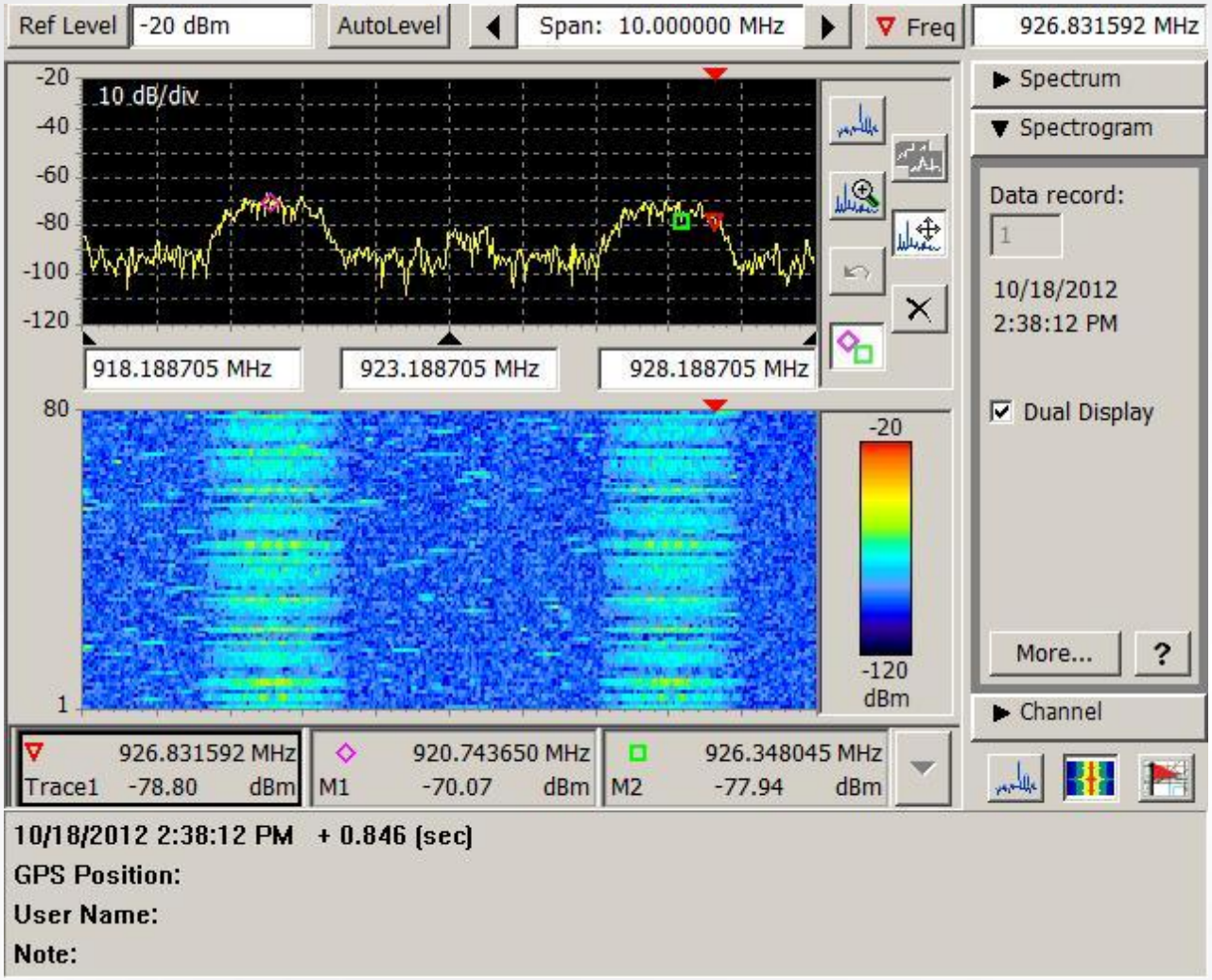
LOCATION 16 – 25 FT. PER



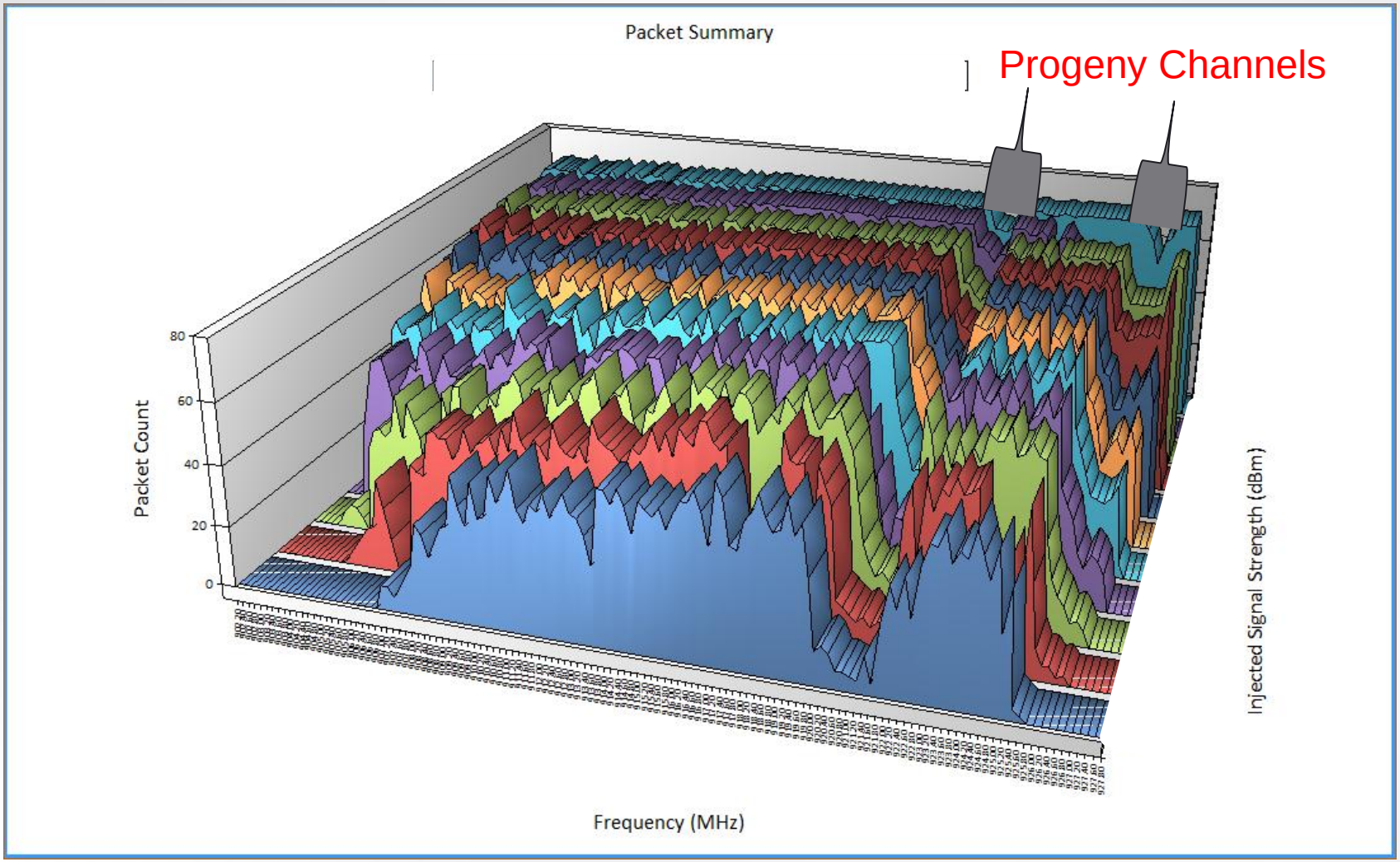
LOCATION 16 – 50 FT. PER



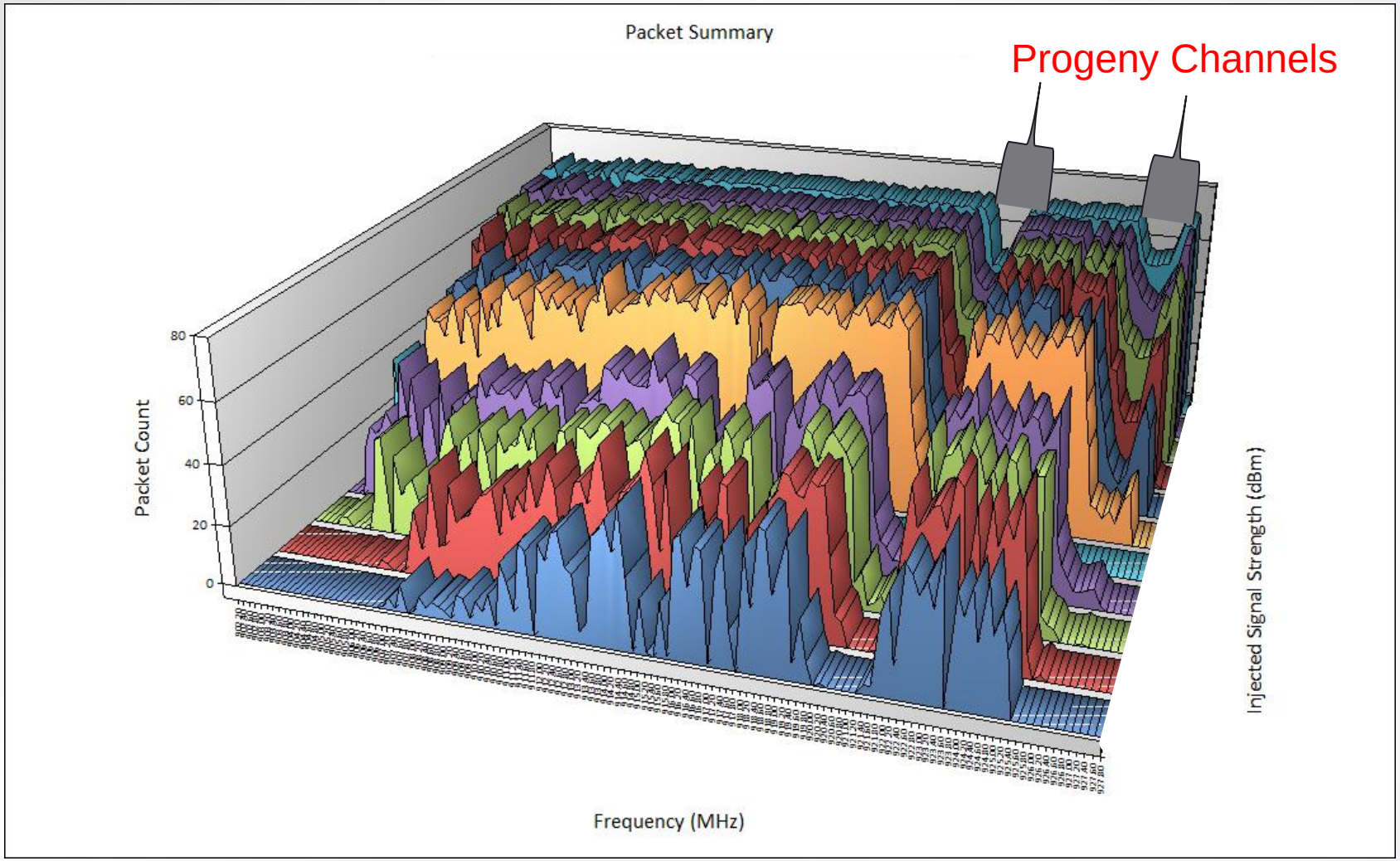
LOCATION 17 - CHANNEL UTILIZATION



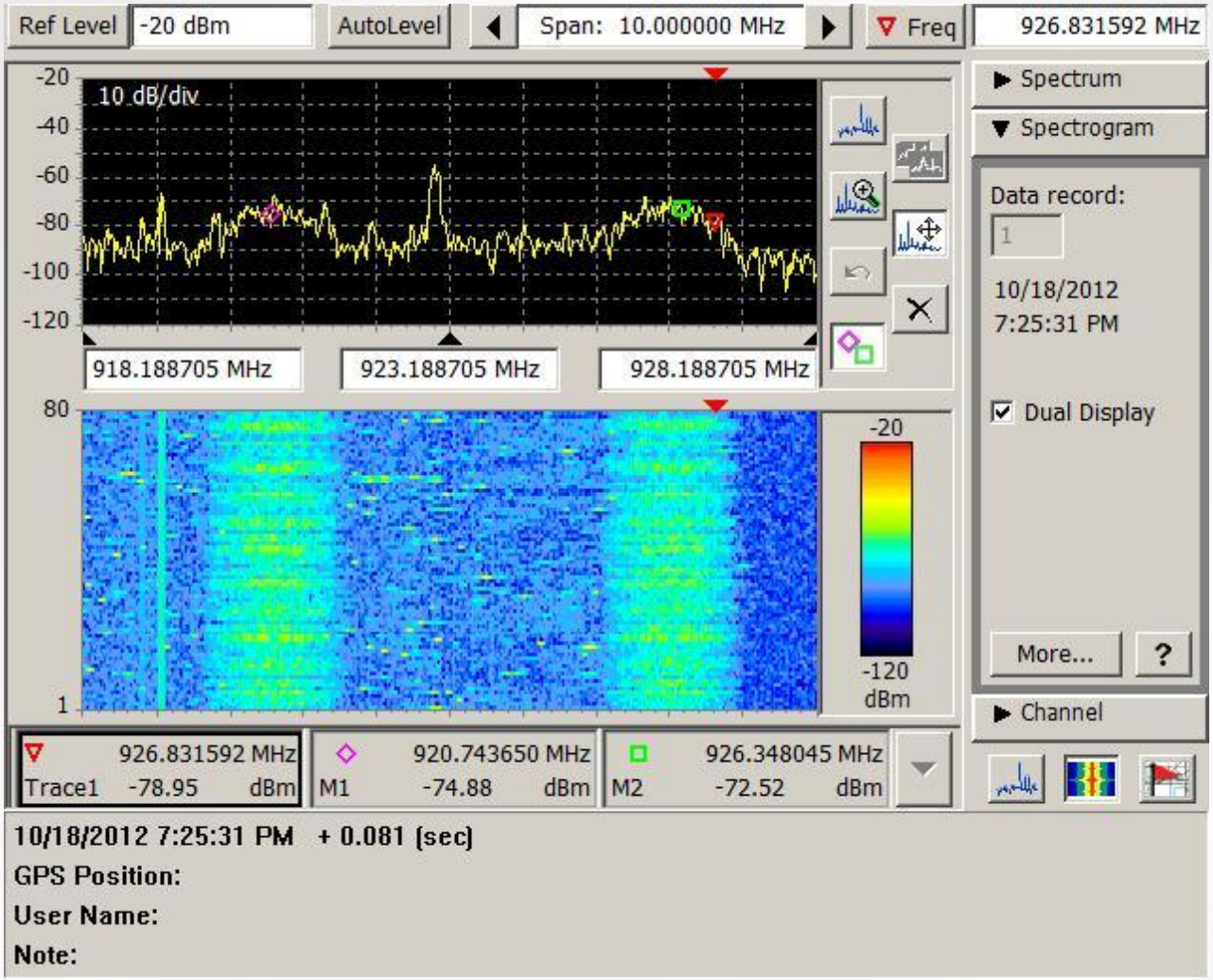
LOCATION 17 – 25 FT. PER



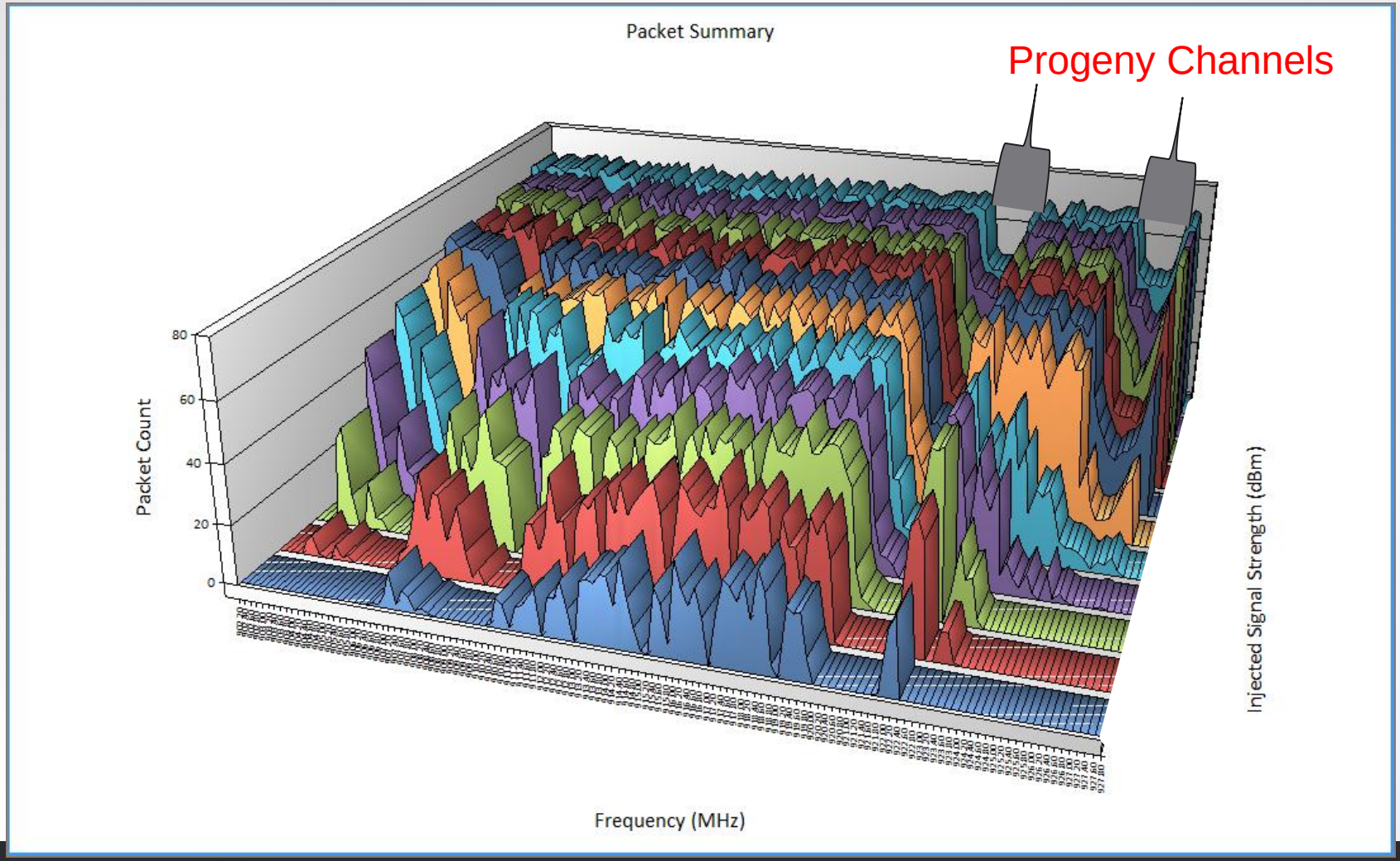
LOCATION 17 – 50 FT. PER



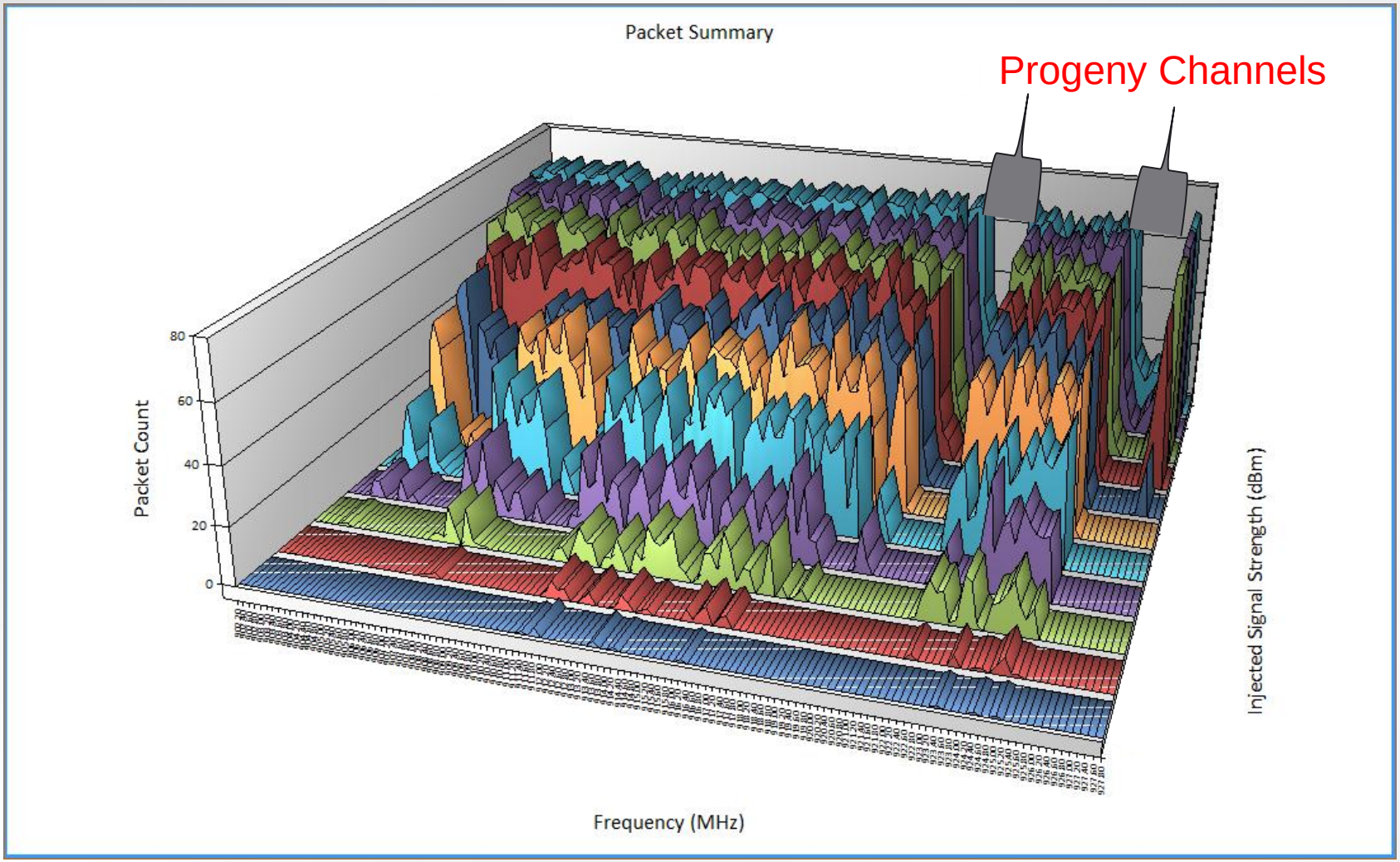
LOCATION 20 - CHANNEL UTILIZATION



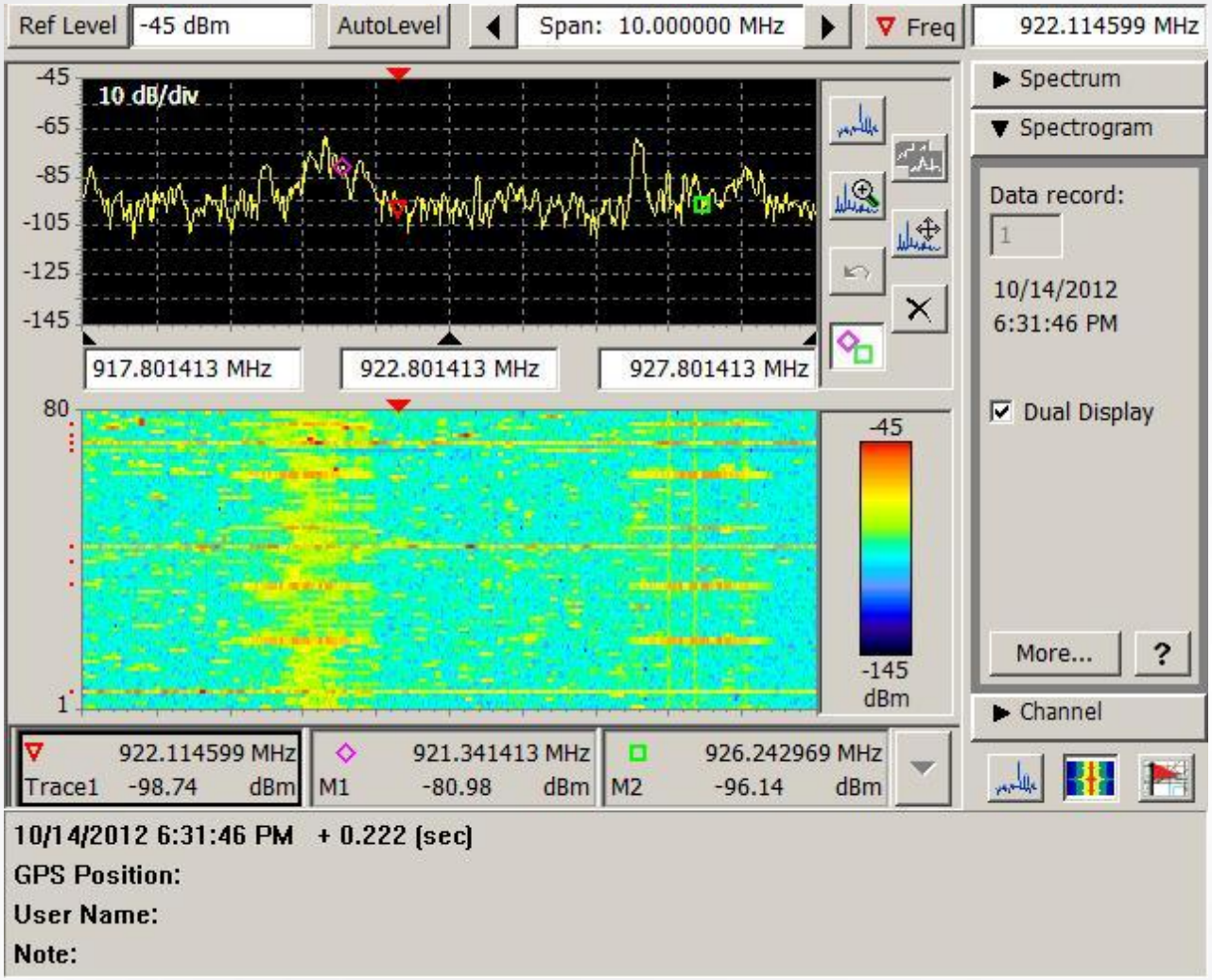
LOCATION 20 – 25 FT. PER



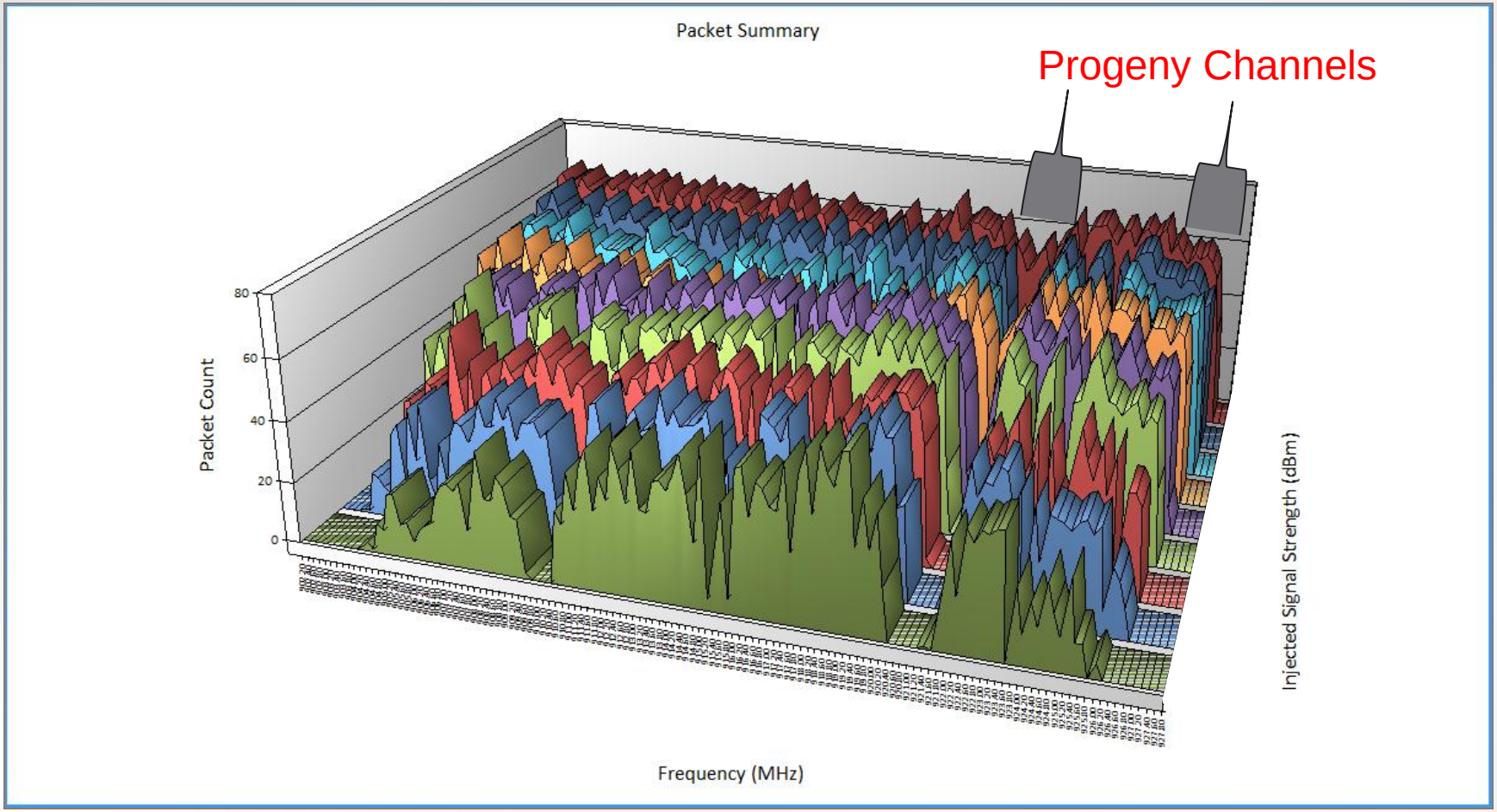
LOCATION 20 – 50 FT. PER



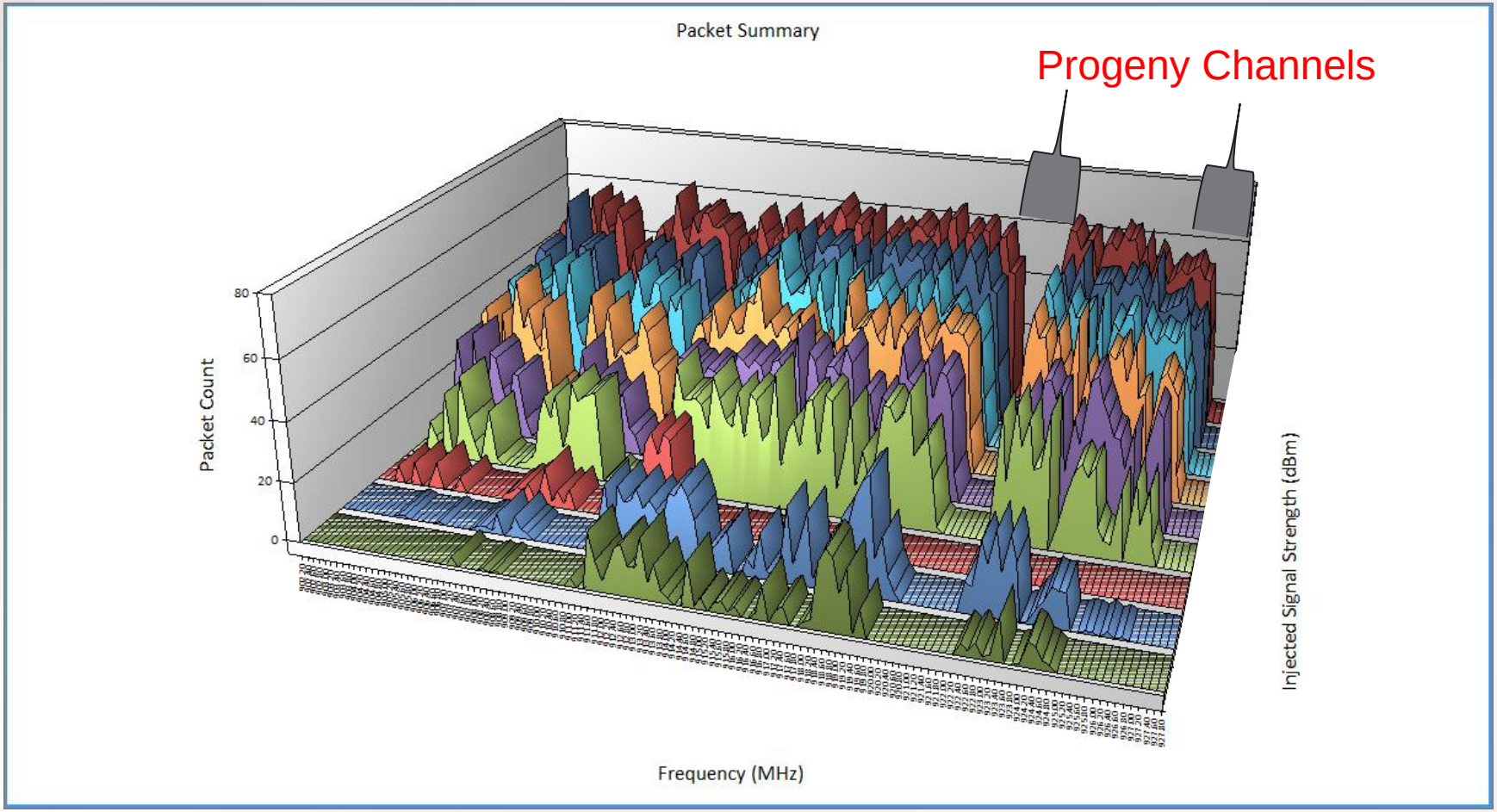
LOCATION 21 – UNBALANCED



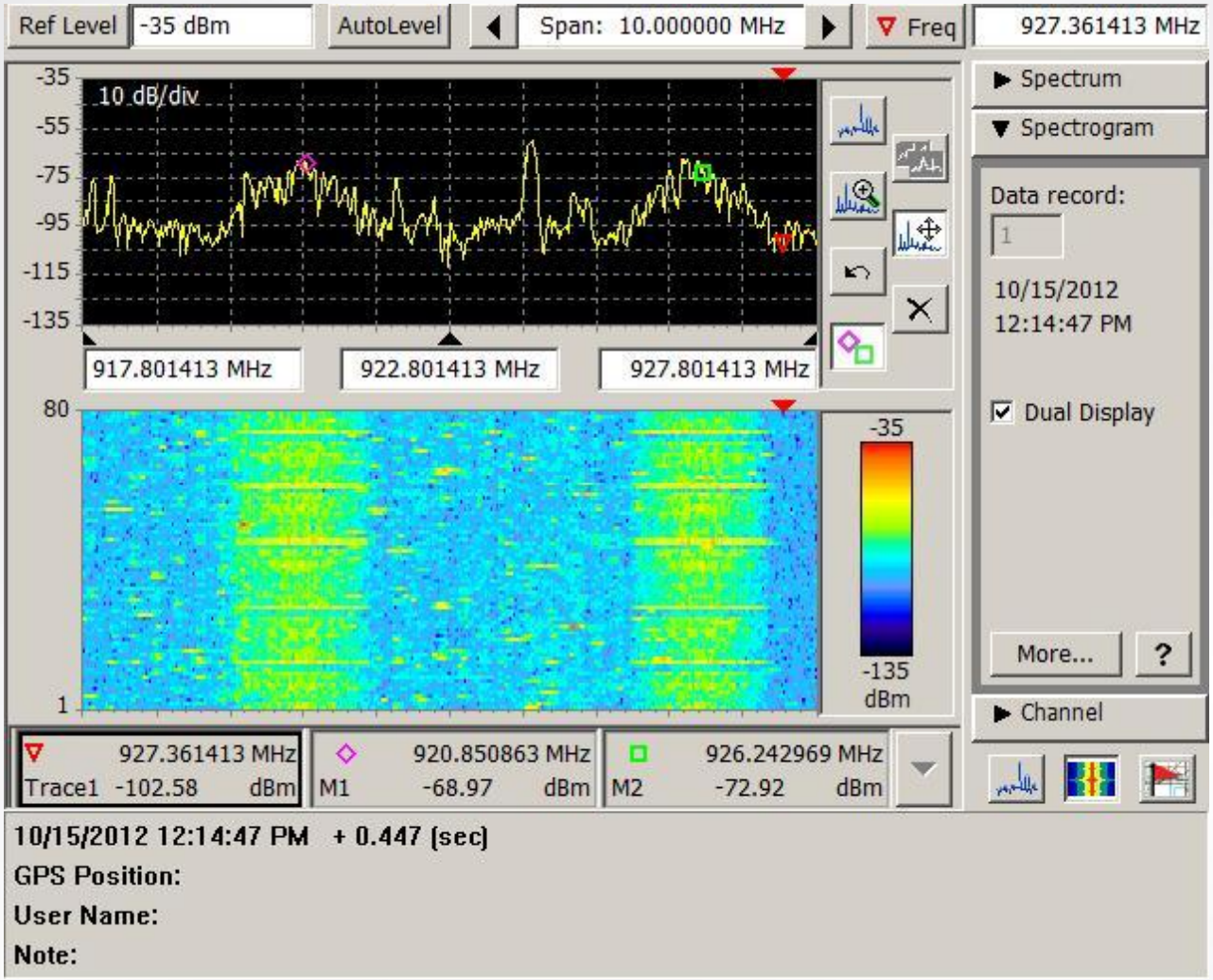
LOCATION 21 – 25 FT. PER



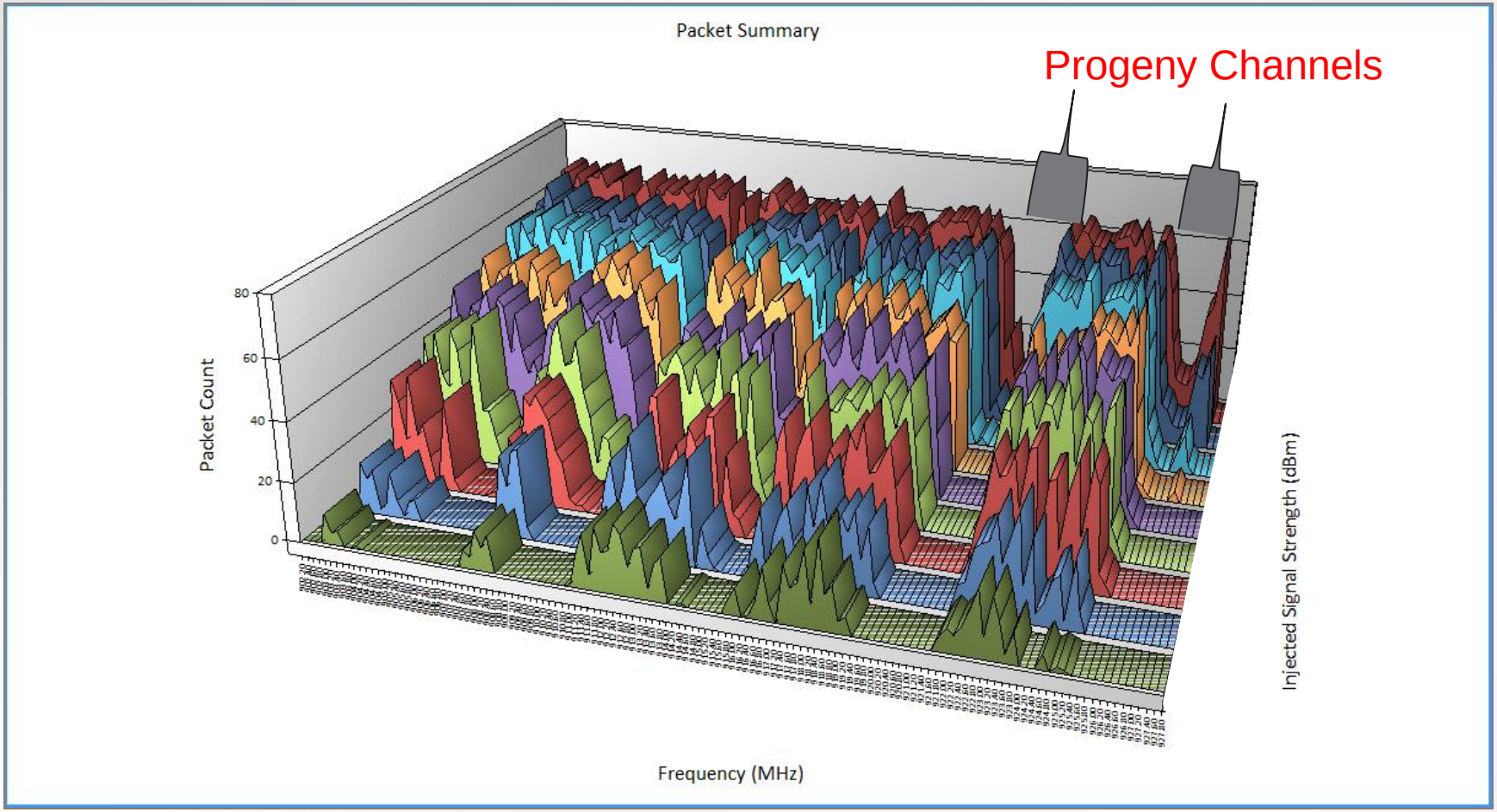
LOCATION 21 – 50 FT. PER



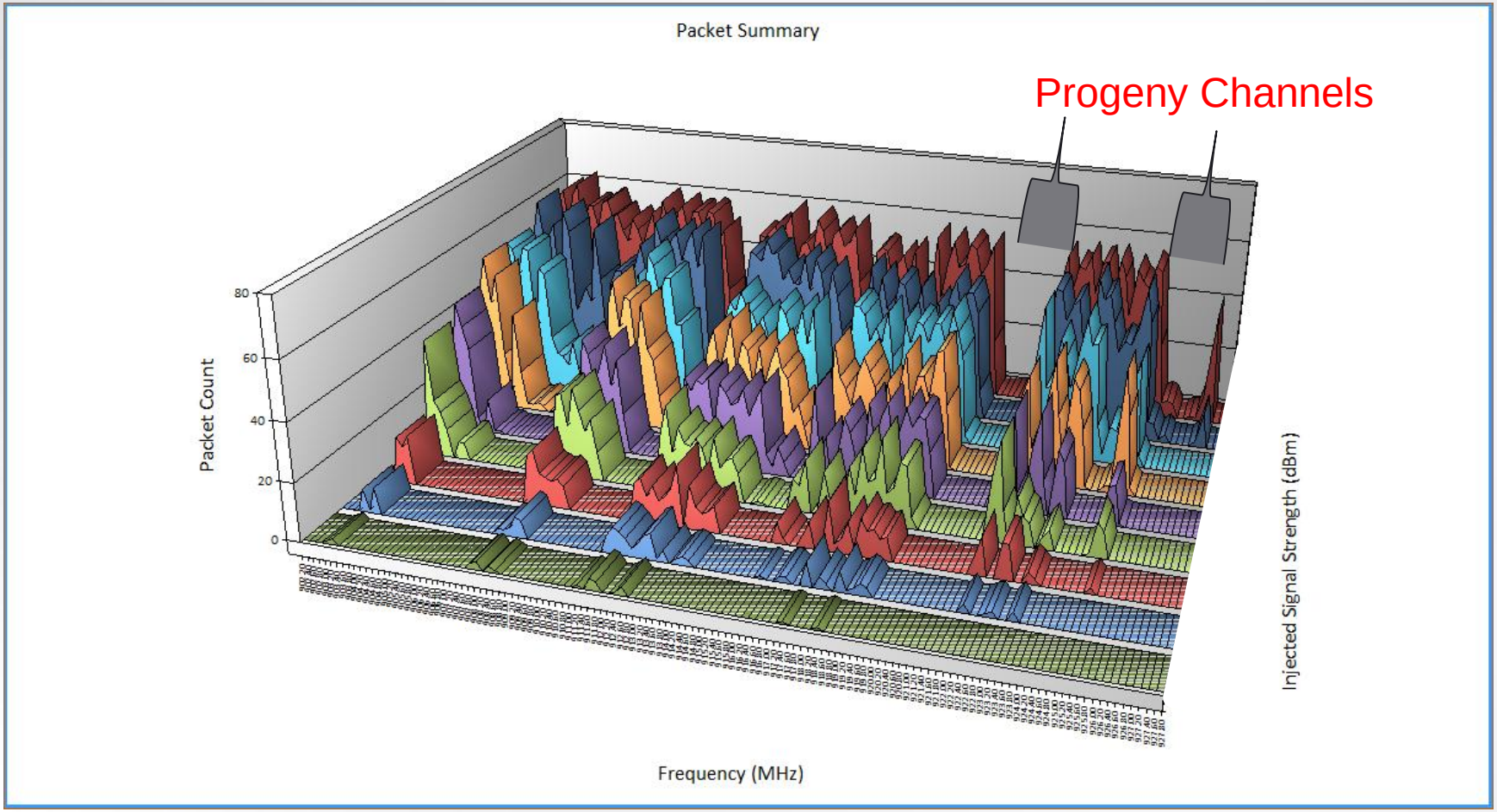
LOCATION 23 - CHANNEL UTILIZATION



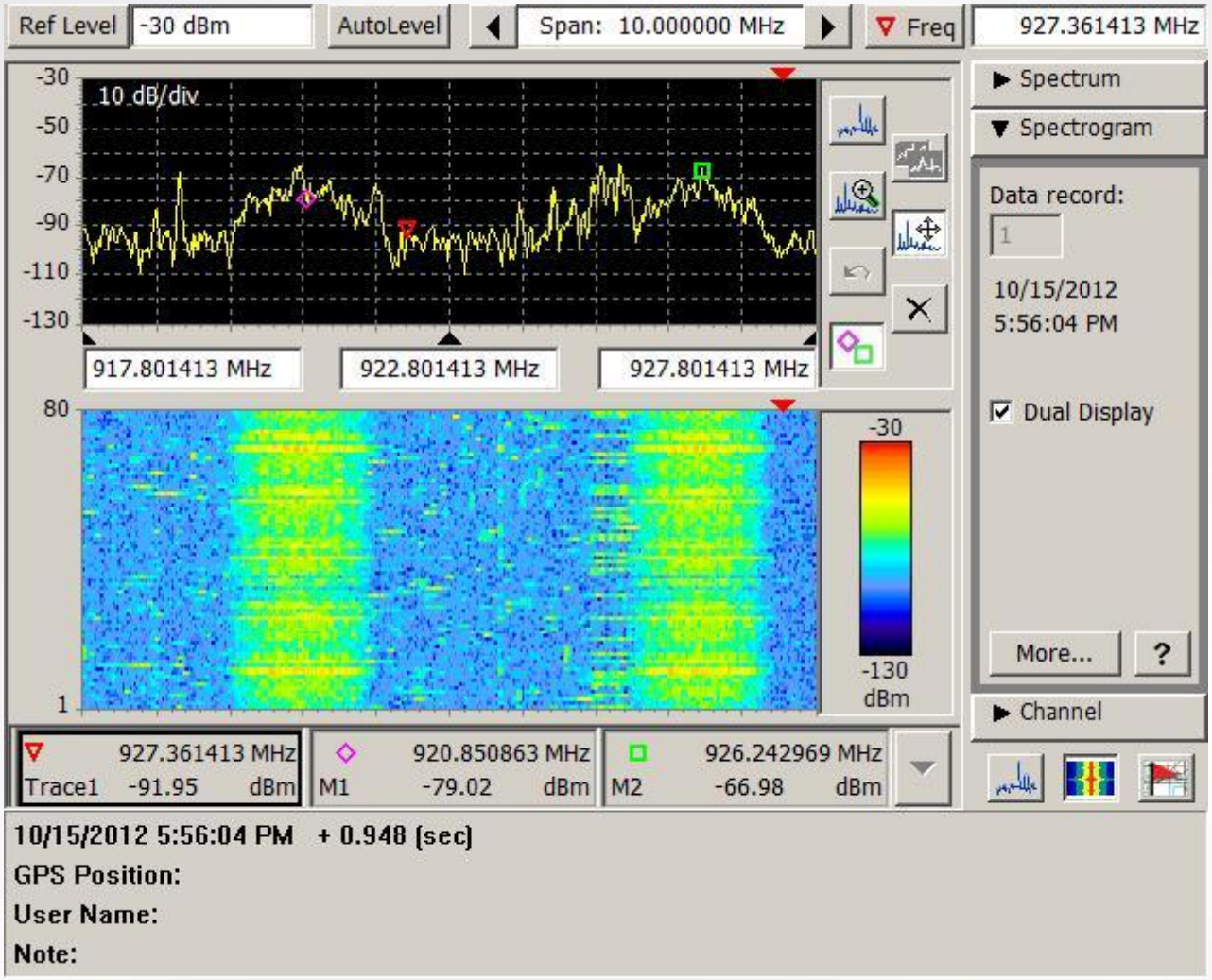
LOCATION 23 – 25 FT. PER



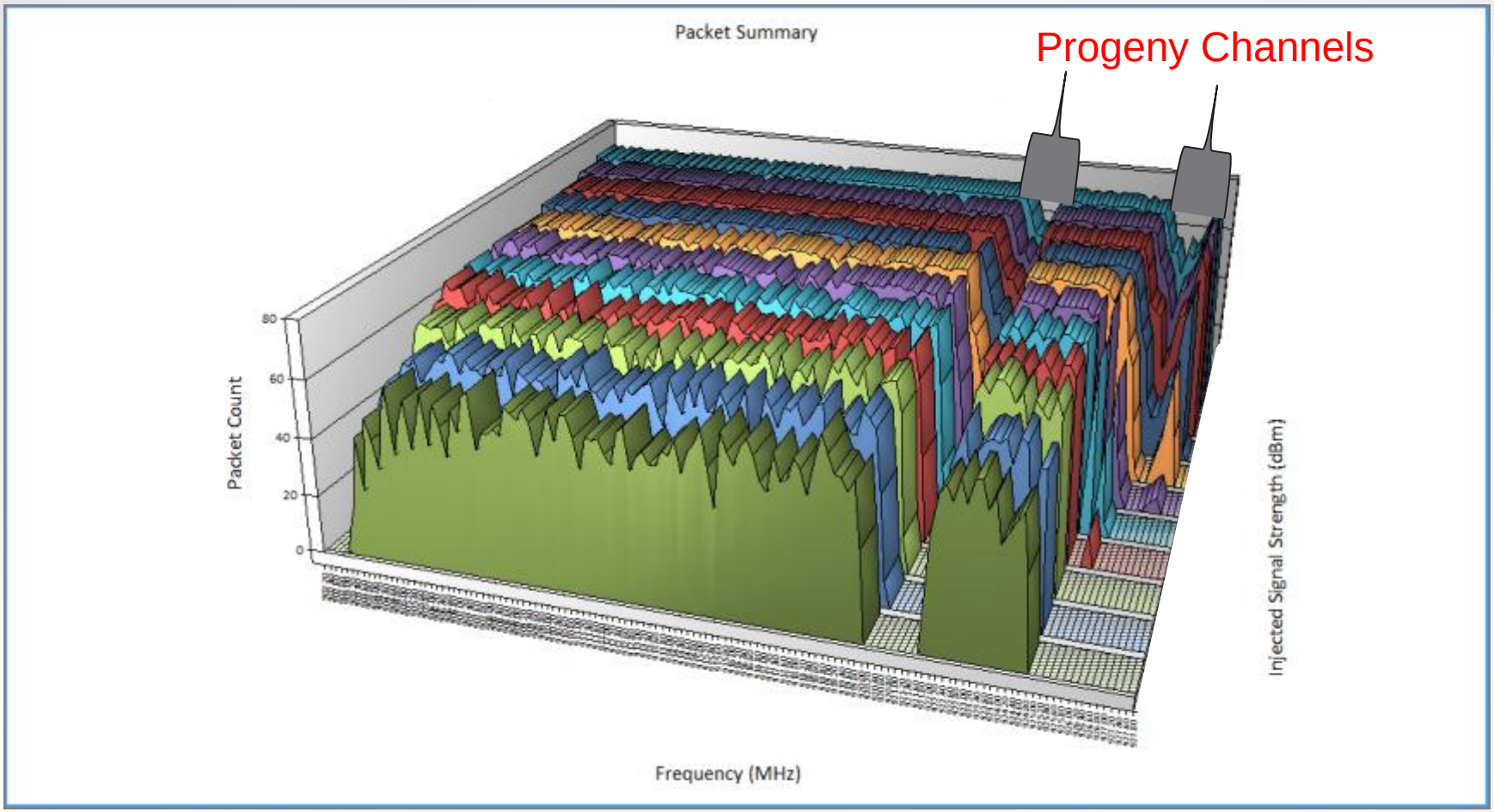
LOCATION 23 – 50 FT. PER



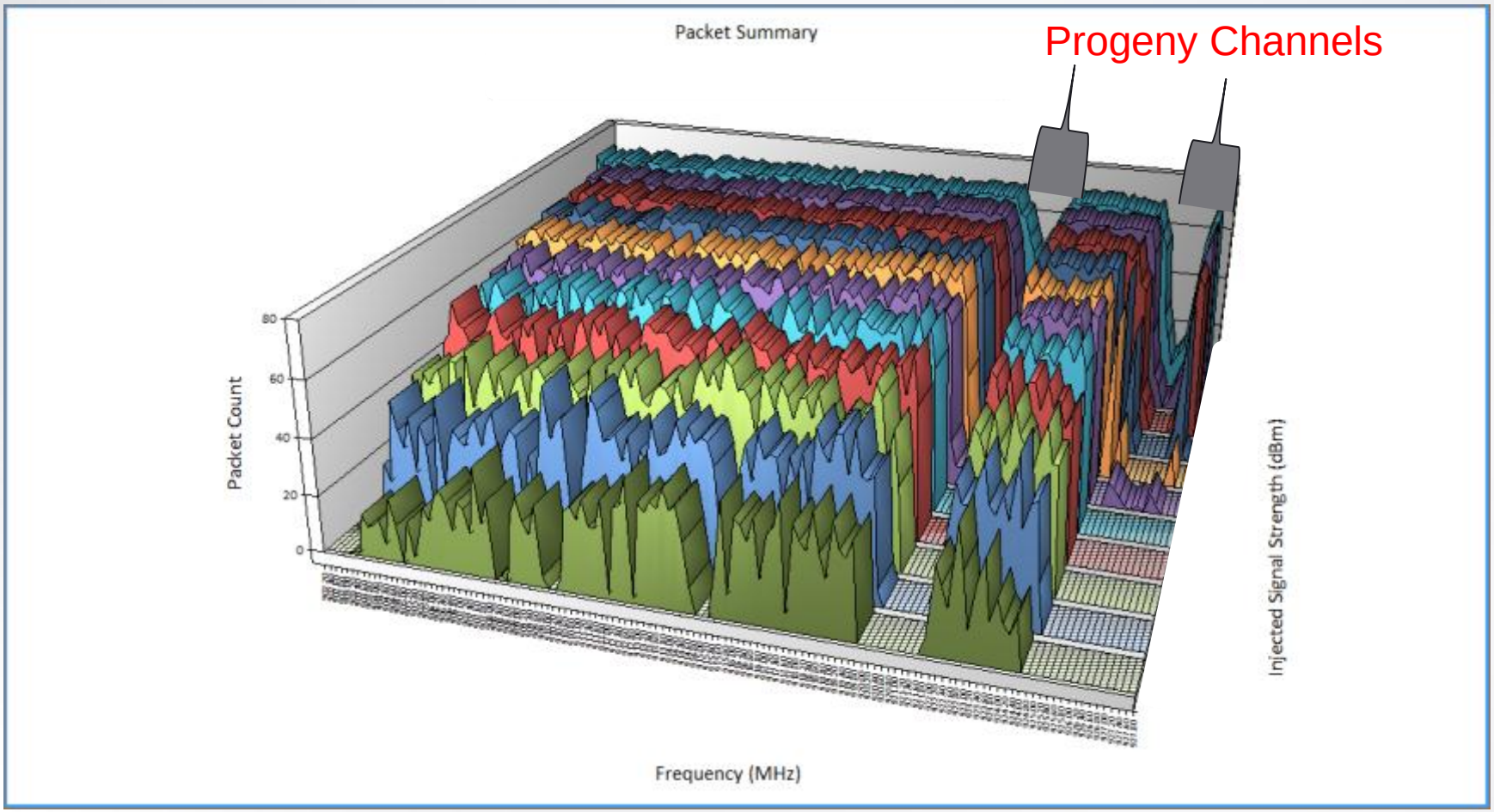
LOCATION 25 - CHANNEL UTILIZATION



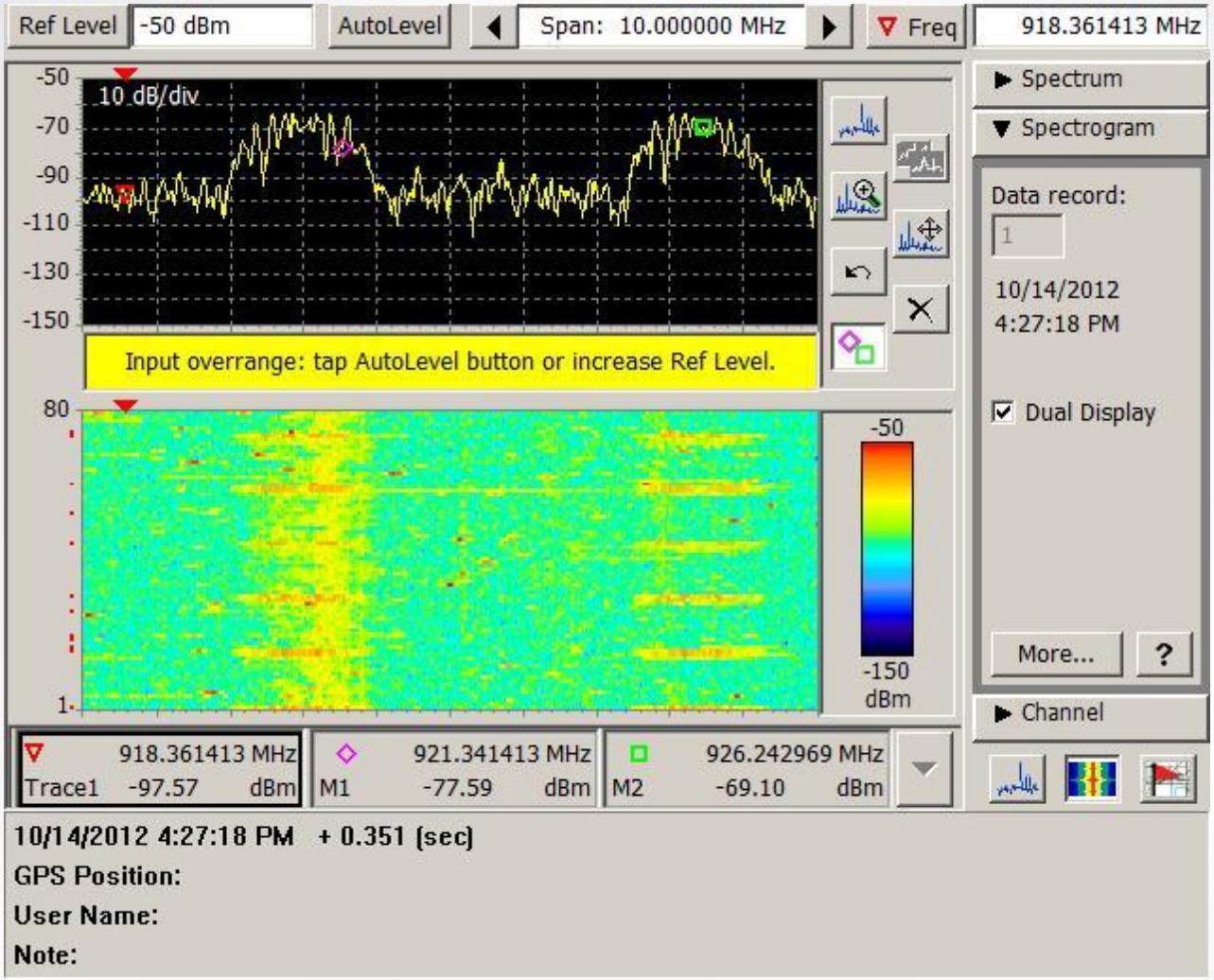
LOCATION 25 – 25 FT. PER



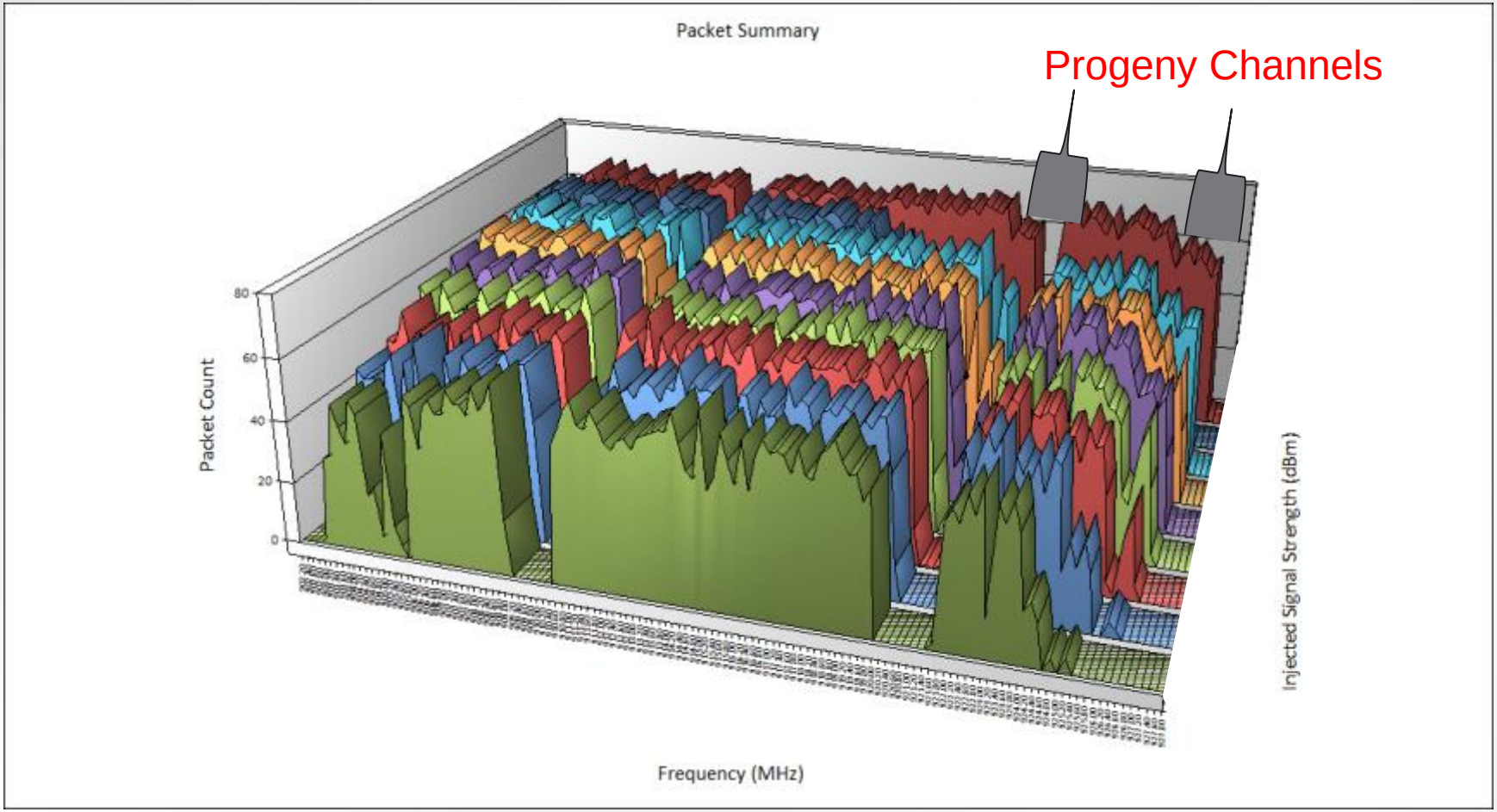
LOCATION 25 – 50 FT. PER



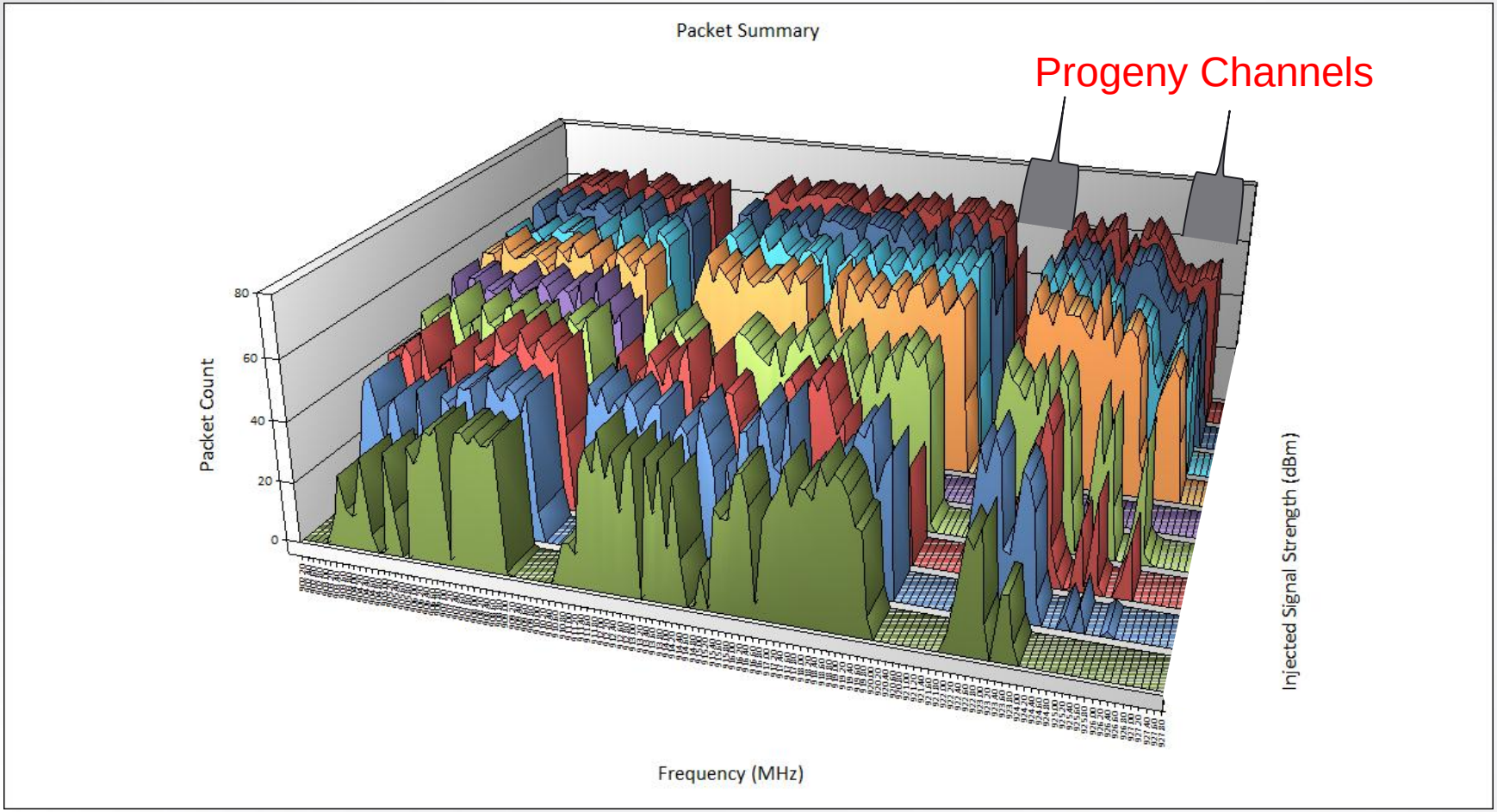
LOCATION 39 - CHANNEL UTILIZATION



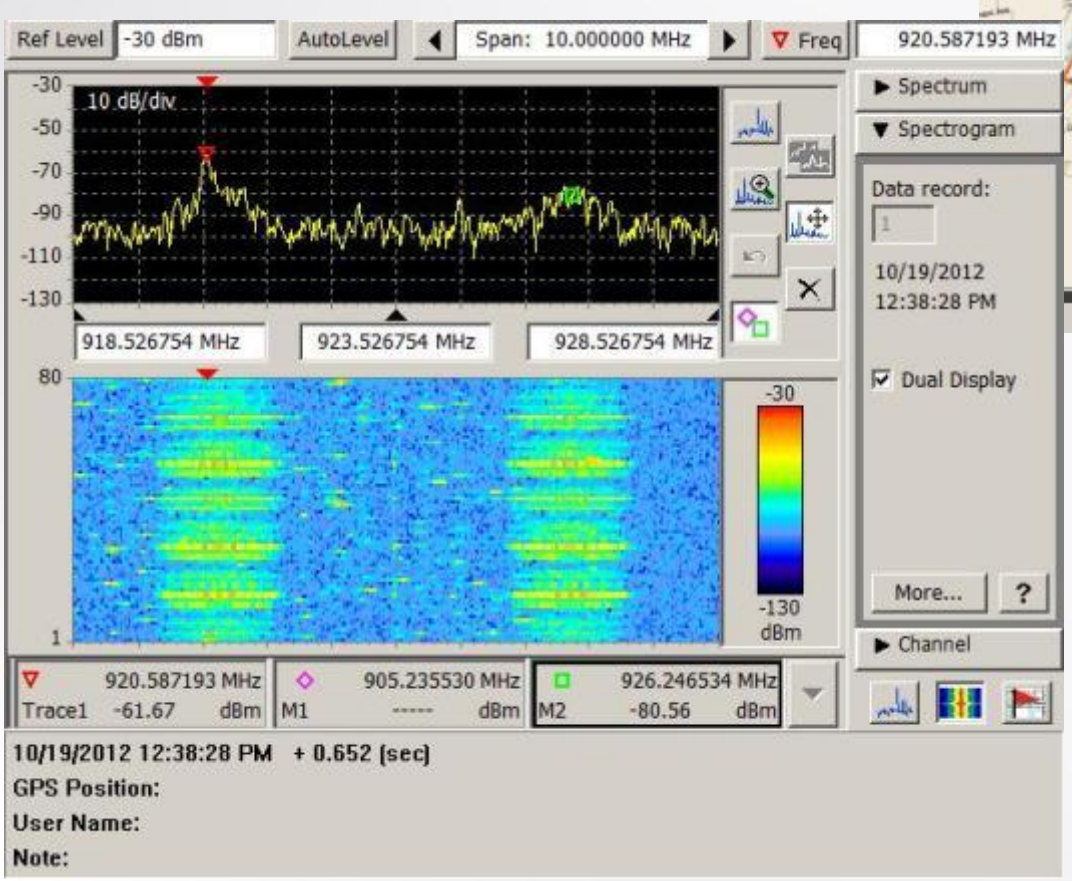
LOCATION 39 – 25 FT. PER

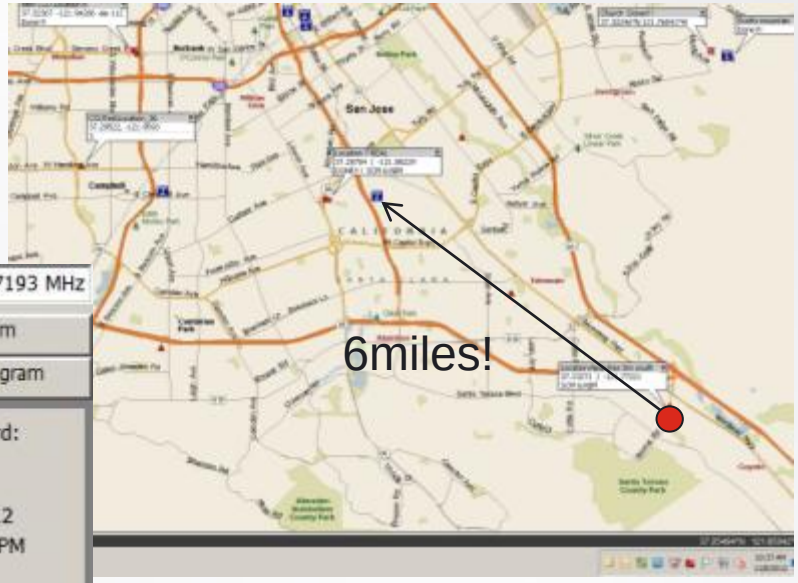


LOCATION 39 – 50 FT. PER

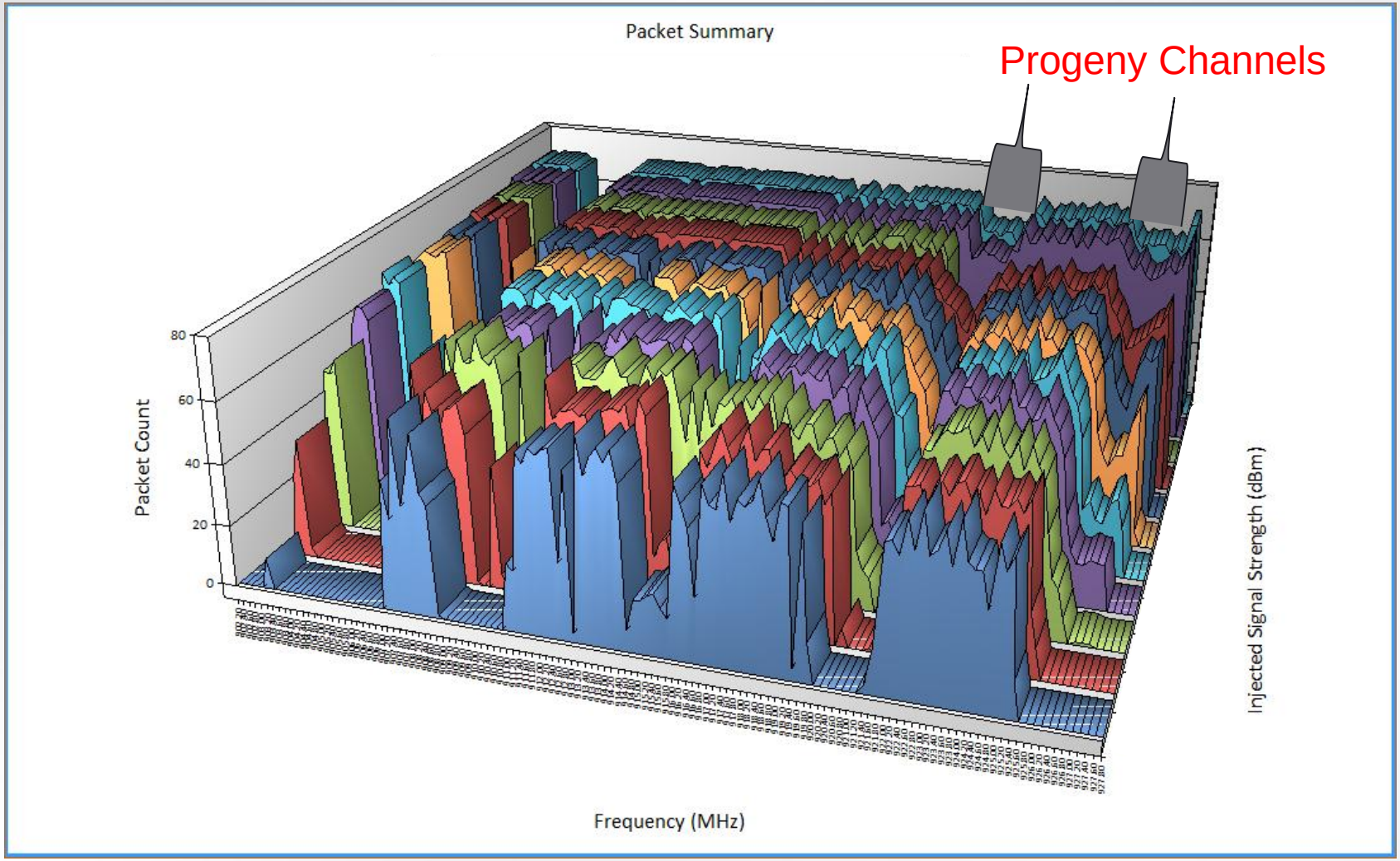


RESIDENCE INN SOUTH - CHANNEL UTILIZATION

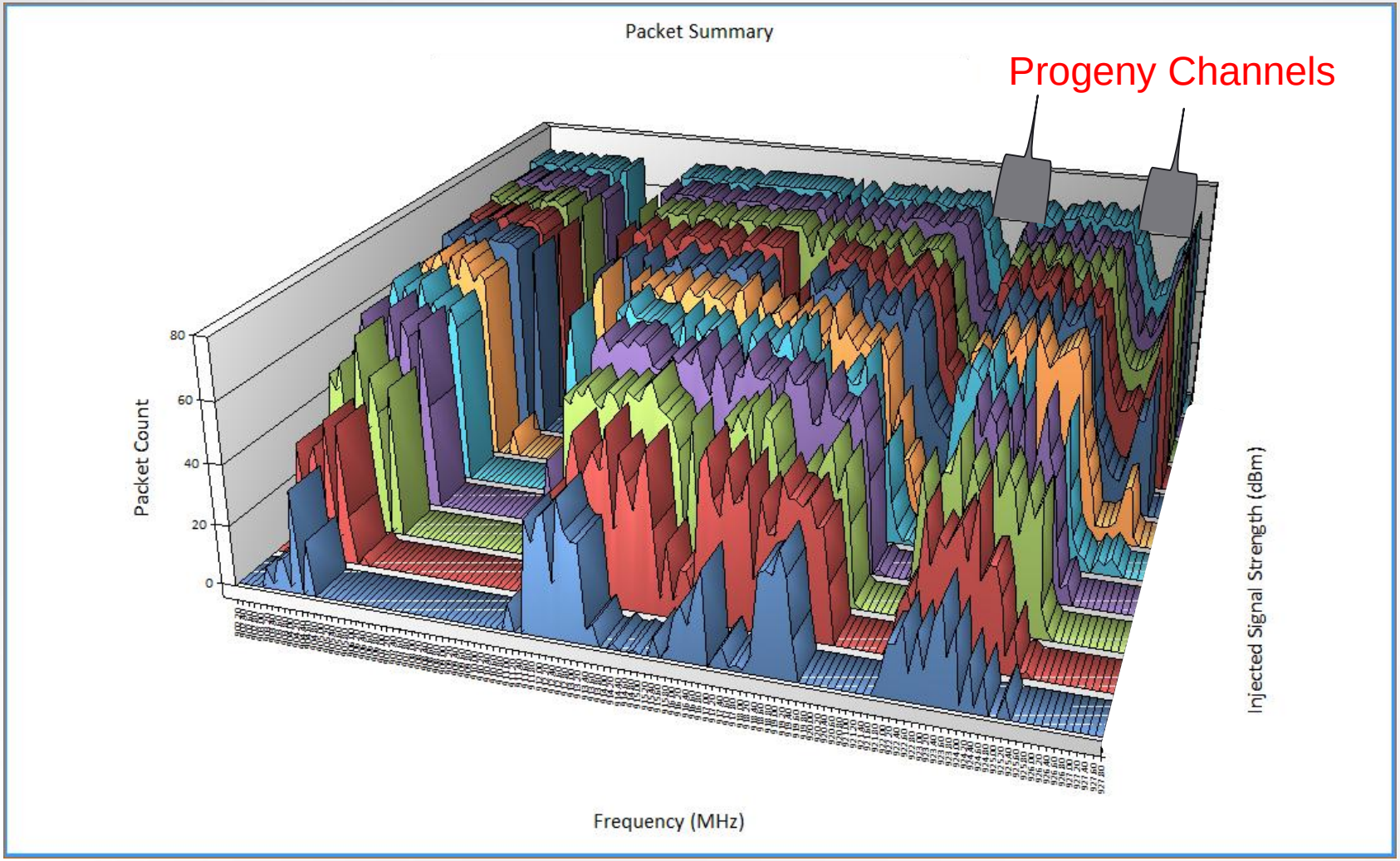




RESIDENCE INN SOUTH – 25 FT. PER



RESIDENCE INN SOUTH – 50 FT. PER



THANK YOU